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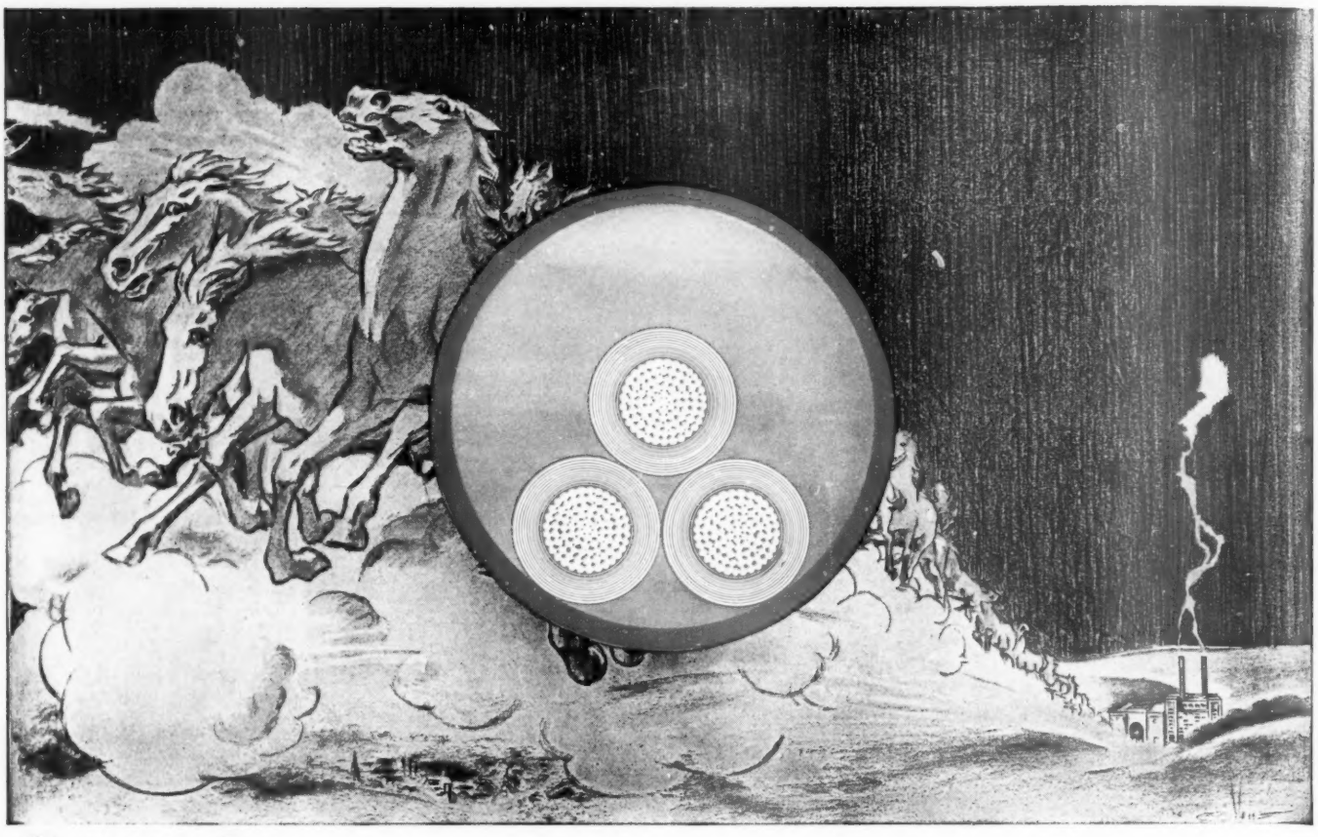

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Vol. 100 June 27, 1936 No. 26

In This Issue

Superintendents in Lively Session ..... Page 1020

A report of the forty-second annual convention of the American Association of Railroad Superintendents, which set a new high mark for constructive work by this organization.

Mechanical Division Holds Meeting at Chicago 1028

A comprehensive account of this organization's fifteenth annual meeting which was devoted to discussions of committee reports.

Inter-City Trucking Proves Efficient 1053

A Motor Transport Section article telling how the Missouri Pacific has established a number of cross-country routes to provide more flexible service for branch-line towns.

EDITORIALS

Opportunity for Association of American Railroads 1017
Superintendents' Association 1019
Big Business Keeps Its Dole from N. Y. Taxpayers 1019

GENERAL ARTICLES

Superintendents in Lively Session 1020
C.P.R. Jubilee 1022
Rail Failure Statistics for 1934, by W. C. Barnes 1023
The Railroads at the Texas Centennial 1025
Claim Agents Survey Performance and Problems 1026
Freight Car Loading 1027
Mechanical Division Holds Meeting at Chicago 1028

MOTOR TRANSPORT SECTION

Inter-City Trucking Proves Efficient 1053
New Co-ordinating Equipment for Handling Milk Containers 1055
I. C. C. Continues C. and D. Hearings 1056
Many 1935 Railroad Reports Discuss Motor Transport Operations, Part II 1058

RECENT EQUIPMENT DEVELOPMENTS 1061

NEWS 1067

OPERATING REVENUES AND EXPENSES 1078

The Railway Age is indexed by the Industrial Arts Index and also by the Engineering Index Service

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Opportunity for Association of American Railroads

The discontinuance of the office of Federal Co-ordinator of Transportation was a development of some significance and importance. It was significant as an evidence of the influence of organized labor in Washington, because, if the labor union leaders had advocated continuance of the office, the necessary legislation undoubtedly would have been passed. It is important because it eliminates a form of "regulation" actually involving the exercise of managerial functions. Excepting for such attempts as may continue to be made by the Interstate Commerce Commission to exceed its legal authority, management has now been restored to railway directors and executives.

There could easily be too much rejoicing because of the retirement of Joseph B. Eastman as co-ordinator. His work probably has done the railways more good than harm; and it has been fortunate for them and the public that the position of co-ordinator has been filled for three years by a man of such industry, ability, fairness and courage. His research has accumulated a large amount of data that the railways can use to advantage. The frankness and intelligence with which he has talked to shippers and labor as well as railway managements has had wholesome effects. His advocacy of regulation of the railways' competitors helped to convince the public that the railways' claims of unfair treatment by government were well founded and to secure passage of the Motor Carrier act.

Most of his definite recommendations for action by the railways were regarded by railway officers as unpractical; but they stimulated investigation and action; and the Association of American Railroads was organized largely to provide a form of self-regulation for the railroad industry which would demonstrate that there was no need of a government co-ordinator. The abolition of the co-ordinator's office has "put it up" to the association to show that it can and will so function in accordance with its by-laws as to accomplish its announced purposes.

Railways in 1929, 1933 and 1936

The office of co-ordinator was created three years ago because of belief in Washington that the railways were heading for financial destruction and required more government interference and aid to avoid it. In an accompanying table are given railway statistics for the first four months of 1929, 1933 and 1936. Those for the first thirds of 1929 and 1933 (in which the banking crisis occurred) show that three years ago there seemed good reason for fear of general railroad bankruptcy. Gross earnings had declined 56 per cent, operating expenses 52 per cent, taxes only 31 per cent, net operating income 85 per cent. Comparison of the statistics for 1933 and 1936 shows the improvement that has since occurred. Gross earnings increased 38½ per cent, operating expenses 34 per cent, taxes 7 per cent, and net operating income 177 per cent. But comparison of the figures for 1929 and 1936 indicates how much more improvement is still needed. Gross earnings were still 39 per cent less than in 1929, operating expenses 36 per cent less, taxes only 26 per cent less and net operating income 59 per cent less.

	First 4 months of					
	1929	1933	% Inc. or Dec. 1933 under 1929	1936	% Inc. 1936 over 1933	% Inc. or Dec. 1936 under 1929
Gross Earnings	$1,993,624,000	$881,689,000	−55.8	$1,221,271,000	+38.5	−38.7
Operating Expenses	1,473,256,000	702,034,000	−52.3	939,336,000	+33.8	−36.2
Tax Accruals	128,102,000	88,153,000	−31.2	94,399,000	+7.1	−26.3
Equipment and Joint Facility Rents (Dr. Balance)	38,121,000	38,413,000	+1.0	41,423,000	+7.8	+8.7
Uncollectible Revenues	399,000	328,000	−18.0	.....	.....	.....
Net Operating Income	353,746,000	52,761,000	−85.1	146,113,000	+176.9	−58.7

How Railroad Conditions Have Changed

Many say 1929 was an "abnormally" good year, but it was not. The increase in railway traffic and earnings during the decade ending with 1929 was relatively smaller than in any previous decade. And after seven years, including three years of "recovery," they are still only about two-thirds as large as in 1929, and net operating income less than one-half as large. There is no preceding experience of the railways of this country that remotely resembles the small growth, terrific decline and slow recovery of their traffic and earnings that have occurred since the brief depression of 1921-

1922. Nevertheless they are today rendering faster, safer and, on the whole, better service than ever before.

In view of such facts, it seems paradoxical that there are so many criticisms of their present managements as inefficient compared with previous managements. The difference between the conditions that have confronted past and present managements is so great as to make rational comparisons or contrasts almost impossible. And it is these changes in conditions that have created the most difficult problems with which present managements are struggling.

Twenty years ago, in the first one-third of 1916, gross earnings were $121,000,000 less than in the first one-third of 1936. But, operating expenses were $185,000,000 less, and taxes were $44,500,000 less. Consequently, twenty years ago, although the railways had 600,000 more employees than now, the ratio of their operating expenses and taxes to their gross earnings was only 73 per cent, while in the first one-third of 1936, it was 85 per cent. Under government operation in 1918-1919 there occurred an increase in the ratio of operating expenses to gross earnings, and consequent narrowing of the margin of profit, which was never remedied; and subsequent increases of taxes have aggravated the situation. The operation of these influences has been renewed since 1933. That relatively the increase in expenses since 1933 has almost kept pace with the increase in gross earnings has been due to advances in prices of materials and supplies and restoration of hourly wages to the pre-depression basis.

Effects of New Taxes

The full effects of the recent Social Security and the new Railroad Retirement legislation were not felt until March and April. In the first four months of the year they cost the railways $13,700,000 in taxes; while in March and April $2,869,400 for social security and $7,982,000 for railroad retirements were included in taxes, a total of almost $11,000,000 for these two months. At this rate these two new forms of taxation will cost at least $65,000,000 during the first year they are in full effect, and increasing amounts later. We have not as yet enough definite information to estimate the effects of the new taxes upon undistributed earnings. However, every increase in taxes, like every increase in operating expenses, is a deduction from the amount of net operating income that would otherwise be earned. Now, obviously the objective of all efforts to utilize the railways as an agency of national recovery should be increase in their net operating income, because, directly and indirectly, it determines how much they can rehabilitate and improve their properties and service, and, in doing so, how much they can buy from and give employment in the manufacturing and other industries.

The problem of increasing net operating income is that of increasing gross earnings without equally or correspondingly increasing operating expenses and taxes. The problem of increasing gross earnings is that of increasing the amount of traffic handled, because further advances in rates are out of the question, and maintenance of even existing rates is difficult or impossible. It is plain that increases of taxes tend to curtail net operating income, but railway managements have no control over taxes.

The Problem—Net Operating Income

The problem of increasing net operating income as it is faced by railway managements is that of, first, getting more traffic, and, second, keeping rates as high and operating expenses as low as is consistent with getting more traffic. The total amount of traffic that will be available for all carriers will be determined almost entirely by the operation of the political and economic forces which determine the volume of production, construction and employment by other industries. How much of this total traffic the railways will get will depend upon the effectiveness of their competition with other carriers.

The Association of American Railroads, as well as individual managements, can contribute largely toward determining, under any given general economic conditions that may exist, how much net operating income the railroad *industry* will earn. This, and not how much individual railroads earn, will be the vitally important thing; and it is for this reason that the Association of American Railroads may be in future either unimportant or important. There never will be a cessation of competition between railroads as long as there are different lines serving the same territories; and probably there never should be a cessation of inter-railway competition. But the outside competition, regulation and labor problem with which the railroads are confronted demand more co-operation between them than there ever as yet has been or is now. More co-operation is needed to restrict kinds of competition between themselves which unduly reduces their rates or increases their expenses. It is needed to reduce the operating costs of the industry as a whole. It is needed to carry on public relations and sales effort that will improve the public's opinion of them, prevent harmful legislation and increase their traffic. It is needed to enable them to present a united front to organized labor.

A Railroad Program Needed

The record thus far been made by the Association of American Railroads in effecting co-operation for accomplishment of the purposes for which it was created is not impressive. It has as yet done little that could not have been done by previous organizations. The discontinuance of the co-ordinator's office gives it opportunity and responsibility which should stimulate it to tackle the vital problems of the railroad industry which can be effectively tackled only by the industry as a unit. It should survey thoroughly all the difficulties which must be overcome to restore the industry's earning capacity, and then adopt a definite program for overcoming them. Its program should in-

clude not only problems presented by present and proposed government transportation policies and outside competition, but also problems of inter-railway competition and labor relations. The objective of all efforts should be increased net operating income for the railroad *industry*; and this should be especially the objective of all policies and efforts of the Association of American Railroads. It can accomplish little if it lacks the initiative and courage to attack every problem of the industry, including especially the delicate problems of inter-railway competition and relations with organized labor.

Superintendents' Association

No one who attended the convention of the American Association of Railroad Superintendents at Chicago last week could fail to be impressed with the constructive character of the work that this association is now doing. The reports and addresses not only dealt with timely problems of direct concern to operating officers, but they presented these problems with a thoroughness that would do credit to any railway association. The discussions were equally constructive, being characterized to an unusual degree by the willingness of those present to contribute of their experience for the information of others. The extent of the interest in these discussions is demonstrated by the fact that they ran far beyond the time allotted, extending one afternoon until 6 o'clock.

The Superintendents' Association has been criticized, justifiably, by executive officers and by the *Railway Age* in the past for the superficial character of its work. This criticism is no longer warranted, for the work done this year was a credit to any association; no railway operating officer could attend such a meeting and listen to the discussion there without gaining ideas which he could use with value on his own railway.

The work which this association is now doing justifies the active participation of alert operating officers. It warrants also the co-operation of railway managements in encouraging participation by their officers.

The American Association of Railroad Superintendents has an opportunity for service to the railways unsurpassed by any other association in the railway field. It now has a leadership that warrants the confidence and support of railway managements. It is to the interest of the railways that this support be given in order that their operating officers may have the benefit of joint consideration of the many problems that are now confronting them and that are so largely of an operating nature.

The officers who have been in control of this organization's activities during the last few years, and especially during the year that has just closed, are entitled to commendation. The officers who have just taken responsibility are entitled to support of the railways.

Big Business Keeps Its Dole from N. Y. Taxpayers

The New York legislature has adjourned without approving the amendment to the state constitution removing the provision which forbids tolls on the State Barge Canal. There is no question but that this amendment would have succeeded had it not been for the opposition of private business interests, which, by toll-free use of this costly facility, have shifted a large share of the burden of their transportation costs to the shoulders of the taxpayers. The canal is costing New York state taxpayers, in round figures, $10,000,000 a year in interest and upkeep. Among the principal beneficiaries of this dole are several large oil companies, the names of which are household words throughout the country.

Big business opposition to the New Deal these days at times becomes almost hysterical in its defense of the "principle" of free enterprise, but what kind of free enterprise is it which is supported by a crutch such as this New York Barge Canal? The commercial interests who are apologists for a toll-free canal make a ludicrous spectacle with their inconsistency. "Petroleum products," they say (according to the New York Journal of Commerce) "fertilizer and cattle feed would become more costly, if tolls had to be paid for transportation through the canal. Steamship lines operating out of the Port of New York would lose bottom tonnage, such as grain, that is now brought to them through the barge canal. Traffic would tend to be diverted to the St. Lawrence and Mississippi waterways, it is argued, thus jeopardizing the investment in grain elevators, warehouses and port facilities, and reducing employment connected with this traffic movement. Also, it is contended that the federal appropriation for the improvement of the canal, which is being made available at the rate of $5,000,000 yearly, would be lost through imposing the tolls, thus causing a net loss to taxpayers in the state."

Such arguments might with good grace come from a Socialist, or a New Dealer committed to government interference in every realm of economic activity. They are nothing but hypocritical sophistry when they are put forward by business interests who go into a frenzy when they see the government spend taxpayers' money for doles to farmers and the unemployed. Tax payments to the latter, however unwise they may be, at least serve the worthy social purpose of preventing starvation, whereas doles to solvent private business have no justification whatever, social or economic. They are a dishonest and anti-social political shake-down and nothing else.

The *Railway Age*, as its readers well know, has no love for the socialistic and boondoggling policies of the New Deal, but those who have evolved these policies and are carrying them out are, at least, not hypocrites, which is more than can be said of some of the dole-receiving critics of the present Administration.

Superintendents in Lively Session

Excellent committee reports and addresses bring forth animated and informative discussion

THE forty-second annual convention of the American Association of Railroad Superintendents, which was held at the Hotel Stevens, Chicago, on June 16-18, set a new high mark for constructive work by this organization. The reports of the committees were outstanding in their scope and in the amount of practical information which they contained. With the trend of railway employment on the upgrade, and with the prospect of still further improvement in this regard, the reports of the committees on strengthening operating organizations, and on the proper application of discipline, were particularly timely. Reports on high-speed freight and passenger trains were also of immediate interest. These reports aroused extended discussion from the 175 operating officers who were in attendance, and they were supplemented, in several instances, by addresses pertaining to the same subject.

In opening the convention, H. C. Rochester, superintendent of passenger train service of the Canadian National, president of the association, reviewed the activities of the association in the past year, and then dealt briefly with some of the major railroad problems. He pointed out that, despite the upturn in passenger business on the railways, competitors were still making huge inroads. Quoting from various sources, he said:

"In 1935, 651,999,000 revenue passengers were conveyed in inter-city business in the United States by bus, as against 445,995,000 passengers carried by the Class I railways. This represents an increase in bus passengers of 72 per cent over the previous year. The number of inter-city passengers carried by bus was 46 per cent greater than by railway. The air lines handled 746,946 passengers in 1935, the largest total for any year in their history, notwithstanding the number of recent serious air line accidents. There can be no doubt that the motif of the present age is speed."

Officers Elected

At Thursday's session, officers were elected for the coming year as follows: President, J. J. Brinkworth, assistant superintendent, New York Central, Buffalo, N. Y.; first vice-president, C. J. Brown, general manager, Chicago, Rock Island & Pacific, Kansas City, Mo.; second vice-president, J. W. Graves, superintendent, Erie, Hornell, N. Y.; third vice-president, A. R. Pelnar, general superintendent of terminals, Chicago & North Western, Chicago; fourth vice-president, W. A. Aiken, Jr., superintendent of transportation, Richmond, Fredericksburg & Potomac, Richmond, Va.; and secretary-treasurer, F. O. Whiteman (re-elected). J. H. Valentine, superintendent, Chicago, Milwaukee, St. Paul & Pacific, Milwaukee, Wis., and Elmer T. Howson, vice-president and western editor, *Railway Age*, Chicago (re-elected), were elected directors to serve three years, and W. J. Warnick, superintendent, Toronto, Hamilton & Buffalo, Hamilton, Ont., was elected a director for one year to fill the unexpired term of W. A. Aiken, Jr. Chicago was again selected as the location for the next convention.

The report covering the strengthening of operating organizations pointed out ways in which supervisors might be better trained and recommended that particularly at this time when operating organizations have been reduced to a skeleton basis on many railroads, superintendents should build their staffs for tomorrow as well as today. The report also stressed the importance of "yardsticks," such as comparative cost statistics of various operations, to determine the efficiency of the organization.

The report on discipline presented interesting statistics as to the disciplinary systems in use on various railroads, with relation to the number of cases appealed to the national labor board on these railroads. It was stated that, insofar as possible, any discipline applied by a local officer should be sustained by his executives, to improve the employee morale. In welcoming the association to Chicago, W. F. Thiehoff, general manager of the Chicago, Burlington & Quincy, also spoke on organization and discipline, and his address is given in detail later in this article. Dr. R. B. Hersey, associate professor of the University of Pennsylvania, and consultant on mental hygiene for the Pennsylvania, made a short talk on the value of teamwork in all competitive endeavor, and particularly in railroading, where so much of the work is done away from any supervision.

More than 30 members took part in the discussion of these two reports, outlining their experiences in the selection and training of supervisors and employees, and asking questions which were answered by other members in the light of their own experiences.

Car Handling

Expeditious and efficient methods of car handling were the subject of two reports and two addresses, one committee reporting on expediting the movement of cars in yards and terminals, the other on meeting today's demand in the loading of cars. W. C. Kendall, chairman of the Car Service division of the American Association of Railroads, and P. W. Johnston, assistant general manager of the Erie, supplemented these reports with addresses, which are abstracted later.

The report on expediting cars through yards and terminals contains the results of a nation-wide survey in this regard, and gives details as to yard design as well as recommended practice for various phases of terminal operation, based upon these surveys.

The report on meeting today's demands in the loading of cars quoted figures as to the constantly growing use of special equipment and showed trends on the part of the railways to curb such demands and use the greatest practicable proportion of general service cars, together with obtaining heavier loading to reduce the number of equipment units handled and make resultant economies in operation.

Faster Service

The reports of the committees on faster passenger and freight train service gave much detail as to the operating requirements for speed, based on the experience of the past few years, and were supplemented by ad-

dresses by Burt T. Anderson, director of the Bureau of Railway Signaling Economics, and C. A. Taylor, superintendent of telegraph and signals of the Chesapeake & Ohio, on signaling for high-speed train operation. These papers will be published in early issues of the *Railway Age*.

The sixth committee report covered the handling of merchandise traffic, and related, in considerable detail, the progress made by the railways in the past year in handling merchandise expeditiously and economically, and in accordance with the needs of the shippers.

All of the reports and the discussion which attended their presentation, will be abstracted in early issues of the *Railway Age*.

Abstracts of Addresses

W. S. Topping, chief inspector of the bureau of explosives of the Association of American Railroads, outlined the reasons for the existence of the bureau and described what it has done to make the transportation of explosives safe. He summarized some of the ways in which superintendents can help in eliminating hazards in connection with such transportation. R. H. Aishton, retired president of the American Railway Association, was also in attendance and emphasized to the superintendents, in a short talk, the fact that the railway industry offers possibilities to its officers and employees in the next 10 or 15 years unmatched by any other industry.

Mr. Kendall, in discussing car service rules from a superintendent's standpoint, pointed out the monetary savings possible through the correct handling of cars. He said:

"Car service rules are based on the fundamental principle that the owner is entitled to the control of the car to the extent practical under the plan of general interchange between railroads, and they are so framed that the car will automatically return home for use when needed, and for maintenance purposes. The owner is not only best equipped but has the greatest interest in keeping the freight equipment in required condition for service. The rules are not the result of haphazard consideration, nor do they come from any dictatorial group or body. They are the product of continued thought and study on the part of car service, transportation and operating officers throughout the country. By this means, railroads are assured that the very best combined thought has contributed to the development of the code under which the roads operate in combination, and provided in the car service and per diem agreement."

Effect of Frozen Per Diem Plan

Mr. Kendall then discussed the possibilities for savings in various operating phases of car handling, giving instances of mishandling and showing how these cars should have been handled to avoid much unnecessary expense. Referring to the average per diem plan, Mr. Kendall stated that it has reduced the empty mileage on all cars from approximately 39.2 to 37.2 per cent of the total mileage. Empty mileage on plain box and ventilated cars has been reduced from an average of 22.8 per cent in the direction of traffic to an average figure varying from 14.9 to 20 per cent, depending upon the season and local conditions, while some roads have reached a low of 4.9 per cent. The plan has reduced the movement of cars through terminals, as indicated by special studies made. The net tons per train have also been increased measurably.

Mr. Kendall also pointed out instances where the plan is not working out so well, but attributed these cases to lack of supervision, and recommended that the superintendents give more thought and care to the operation of the plan. He also recommended to the superintendents that they give more attention to the heavier loading of cars and cited instances where shippers increased their loading appreciably on request from local operating officers.

P. W. Johnston said, in part:

"The real problem in car handling is to convince responsible railroad officers of the savings possible from increased efficiency and from properly balanced ownership. There is no mystery about car handling that makes it impossible for the local man to handle local distribution. There must be a central authority, and the local handling should not be delegated to a minor clerk. There should be daily distribution orders, as standing car distribution orders are usually an indication of laziness.

"There are great possibilities in closer co-operation between the car repair departments and the transportation officers. The location of car shops should be studied to avoid much empty mileage on cars going to and coming from the shops before and after repairs. Another fruitful source of savings is to be found in co-operation between local operating officers of different railroads in avoiding empty cross-hauls on their respective lines."

Taylor Finds Many Suggestions in Co-ordinator's Studies

At a luncheon on Wednesday, which was attended by a number of the railway executives of Chicago, H. G. Taylor, chairman of the Western Association of Railway Executives, called attention to the fact that Congress had decided to bring to a close the work of the Federal Co-ordinator of Transportation. Referring to the Co-ordinator's efforts, Mr. Taylor said:

"Many of his reports contain suggestions that are valuable and can be put to good use by the railroad managements in the future. It would be a mistake if the railroads were to dismiss the co-ordination act and what has been accomplished without any effort to use its benefits. All will agree, however, that it was a more or less abortive effort to produce progress and results from the outside for a great industry that was quite capable of taking care of itself."

Mr. Taylor then cited the chronological development of railway regulation since the Act to Regulate Commerce of 1887, pointing out that 26 major legislative acts affecting the railways have been passed since that time, as well as hundreds of regulations of less importance. He pointed out that, in the present session of Congress alone, 386 bills were introduced dealing directly or indirectly with railroads.

Mr. Taylor also outlined the growth of the Interstate Commerce Commission from 5 members in 1906, to 7 in 1917, 9 in 1920, and 11 at present, and referred to Commissioner Eastman's recommendation that this be increased to 15. He called attention also to the increase in expense for the commission from $15,140 the first year, to $8,854,000 in 1931, and said that the total expenditure for the commission from its inception to date has been $143,000,000. Mr. Taylor continued:

"There has been real, constructive and constant progress in the railroad industry for the past hundred years. During the past few years, the improvements have been much more spectacular, but they have only been made possible by the long, laborious process of improvement that has been going on for years. Railroad men should stress the unseen improvements in the railroad structure that make possible the more showy things of today. The railways have conducted research work equal to that of almost any other industry, as is evidenced by the recent tribute paid to railway research by Charles Ket-

tering, the world's outstanding research authority. Railway men will have reason to be proud, in the next few years, that they belong to the industry that has done so much and continues to do much toward the building and the progress of the nation."

Mr. Thiehoff's address is given below:

Proper Operating Organization

By W. F. Thiehoff*

When one receives an appointment as superintendent of a division of a railroad, he is given authority to supervise, to instruct, and to direct the activities of others, which automatically carries with it responsibilities. To be consistent, first consideration must be given to responsibility in the exercise of authority, to be sure that instructions issued are practical and understandable and the requirements within reasonable limits.

Experience and Ability to Teach

An inexperienced person cannot successfully supervise employees experienced in their line of duty. He may have a carefully planned and fully developed education, but, lacking practical experience, he will fail where one with a lesser degree of education, but with a practical and technical knowledge of the work in hand, will succeed.

Assuming the supervisor is experienced in the service required, what next? Ability to teach. An officer may be seasoned in the service and yet fall flat in the effort to direct the activities of others unless he can teach them to so employ methods and coordinate their energies as to produce efficiently and economically. Teaching does not mean that it is sufficient to preach. A superintendent can preach indefinitely with little result, unless he can practise what he preaches; so, by suggestion, instruction, and practise, the inexperienced employee may understand the requirements of the duties assigned to him and his responsibilities in performing service in the discharge of his duties.

While teaching the inexperienced employee, careful consideration should be given to his qualifications to determine within a reasonable time whether he has the ability to learn the things required by the class of service he is to render and whether he has capacity for increased responsibility. The individual is being done an injustice by continuing him in a service for which he is not fitted and unable to acquire the experience that would warrant his permanent employment. The performance of the experienced employee should also be checked. This will require less time perhaps than to teach the inexperienced, but the importance of doing so should not be overlooked.

Another necessary qualification is the understanding of human nature. A railway officer must know how to bring out the best in each individual. Some are reticent and resentful, others confiding and optimistic; some sober and industrious, others joyous and easy-going; some saving and others extravagant. Some require driving, others coaxing—all of them encouragement. So, our duty is to understand the individual and use the methods that will bring out the best in each. While there may be a different human element to deal with in each individual employee, they will respond alike to commendatory recognition of their good service or their loyalty. A pleasant greeting, and a cheery "Well Done" bring great returns.

Constructive criticism is sometimes necessary and usually received by the right thinking employee as a special benefit through which he can improve his methods and by doing so, increase his chance for promotion.

Discipline Begins With One's Self

Discipline is the premium paid on an insurance policy covering safe and efficient operation. Who should be disciplined? First of all, ourselves. We should understand the need for self-control. If we are prone to be self-willed, stubborn, unkind, resentful, complaining, let us correct these faults. If we are ill-tempered, consider the effect it has on our own disposition and peace of mind and then multiply this by the number of employees we supervise or associate with and we will be so alarmed at the result that we will immediately make correction. There are, and perhaps always will be, individual employees who think discipline is personal punishment, administered by supervisory officers because of personal dislike; so our duty, when we apply corrective measures by administering discipline, is to explain to the employee involved his violation of rules.

Can we secure better results by establishing and continuing pleasant relationships? Surely. Let us go back to our own department and look around. Are the buildings sanitary and reasonably comfortable? If there is need for correction, has it been called to your attention? Have you discussed it with your superior officer? As a supervisor that is part of your duties. Recognizing that wholesale changes and improvements come slowly and only as funds can be provided by earnings or borrowing, we must anticipate our needs, based on safety, the actual necessity in order to continue service to the public, regardless of the expense, and the increased efficiency and economy that will result.

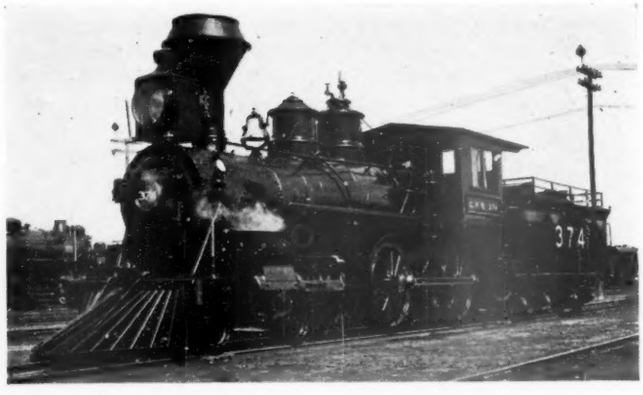
In proposing these things, we must agree that safety should be first; then to maintain service to the public is the obligation of the carrier. With these two essentials taken care of, we should plan carefully for the future, saving to spend and spending to save.

* General Manager, Chicago, Burlington & Quincy.

C.P.R. Jubilee

MARKING a half century of the Canadian Pacific, the fiftieth anniversary of the departure of its first transcontinental passenger train from Montreal will be celebrated on June 28. A "send-off" has been arranged for the departure of the "Dominion" limited, which leaves Windsor Station at 7.20 p. m., standard time, June 28, on the anniversary of the first train.

The country-wide celebration that greeted the operation of the first train will be repeated with bands and prominent citizens welcoming the anniversary train at Ottawa, Fort William, Winnipeg, Regina, Calgary, and other points. The feature celebration will be near the end of the journey, however, when the train will be welcomed to Port Moody, B. C., with a ceremony resembling as closely as possible that at the arrival of the first train in 1886.



Replica of Locomotive of C. P. R.'s First Transcontinental Train, Built at Weston Shops, Winnipeg, for July 3 Ceremonies at Port Moody

The anniversary train will be pulled by specially decorated locomotives At the Pacific end of the run, a replica of the original locomotive, with diamond smoke stack, will pull the anniversary train into Port Moody on July 3.

Gathering at Windsor Station, Montreal, on June 28, to aid in the celebration will be the band and guard of honor from the Victoria Rifles, the same regiment that acted in the send-off for the first train. Mayor Camillien Houde will represent Montreal, acting in the same capacity as Montreal's Mayor Beaugrand of 1886.

Rail Failure Statistics for 1934

Information compiled by American Railway Engineering Association includes data on transverse fissures

By W. C. Barnes
Engineer of Tests, Committee on Rail, A.R.E.A.

[The compilation of statistics on failed rails is an important activity of the Committee on Rail of the American Railway Engineering Association. This work, which has been carried on without interruption since 1912, is under the direction of the committee's engineer of tests, a position which has been occupied for a number of years by Mr. Barnes. The data are presented in the form of annual progress reports which are divided under two heads: (1) Rail Failures and (2) Transverse Fissures. An abstract of these two reports, covering the statistics for 1934 and including in part the data for previous years, is presented below.—EDITOR.]

Rail Failure Statistics

The rail failure statistics for the year ended December 31, 1934, as presented in this report, have been compiled in accordance with the standard method of basing the failure rates on mile-years of service in track. The reported tonnages and track miles of rollings for 1929 and succeeding years embodied in these statistics are as follows:

Year Rolled	Tons	Track Miles
1929	1,719,426	9,777
1930	1,243,659	7,032
1931	793,977	4,417
1932	241,719	1,375
1933	189,320	1,011
Totals	4,188,101	23,612

Table I shows the average number of failures per 100 track miles of rail in service which occurred during the first five years service in all rail reported and includes both Bessemer and open-hearth rails. The 1929 rollings, on which observations are now concluded, show an average of 121.2 failures per 100 track miles during the five-year period, an increase of 44.8 over the rate reported last year for the 1928 rollings. The failure rate for the 1929 rollings is higher than that for any other rolling of the last 11 years with the exception of that for 1926. Both service and detected failures are included in this table. Figure 1 shows the five-year averages from Table I diagrammatically.

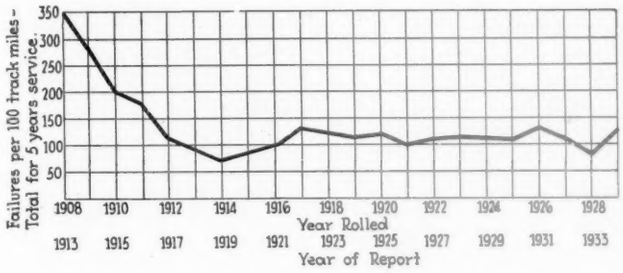


Fig. 1. Rail Failures in the United States and Canada

Fig. 2 shows diagrammatically the failure rates, based on the number of failures per 100 track miles per year, unweighted for traffic, of rollings of various mills for the years 1929 to 1933, inclusive. The figures include

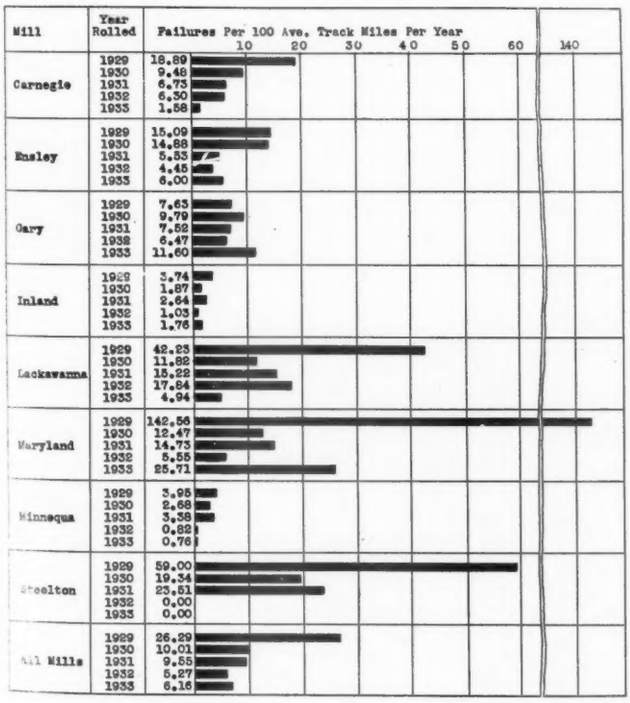


Fig. 2. Failure Rates (Service and Detected Combined) by Mills from Date Rolled to December 31, 1934

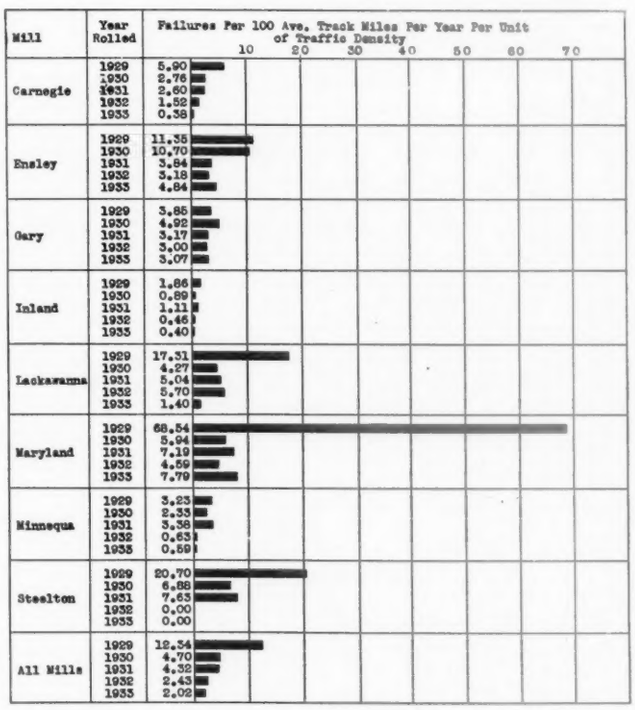


Fig. 3. Failure Rates (Service and Detected Combined) by Mills from Date Rolled to December 31, 1934, Altered by Traffic Density Factors

both service and detected failure rates. It can be forecast from this diagram that the all-mill failure rates which will appear in next year's report will be considerably improved over those shown here, as the 1929 roll-

Table 1—Average Failures Per 100 Track Miles—All Mills

Year Rolled	Years Service 1	2	3	4	5
1908	...	...	...	...	398.1
1909	...	...	...	224.1	277.8
1910	...	...	124.0	152.7	198.5
1911	...	77.0	104.4	133.3	176.3
1912	28.9	32.1	49.3	78.9	107.1
1913	12.5	25.8	44.8	69.5	91.9
1914	8.2	19.8	32.9	50.9	74.0
1915	8.9	19.0	34.2	53.0	82.4
1916	11.8	29.2	47.7	70.6	105.4
1917	21.6	38.9	66.0	110.5	137.0
1918	8.9	27.6	54.0	92.8	125.4
1919	14.8	39.4	73.7	104.8	115.7
1920	14.2	32.4	63.1	84.5	119.6
1921	10.9	34.9	56.9	70.9	98.9
1922	15.9	34.8	55.2	80.4	110.0
1923	14.3	33.2	57.6	86.0	114.1
1924	14.0	33.4	58.3	82.0	110.7
1925	15.5	36.6	58.3	76.6	110.7
1926	17.1	41.2	64.6	102.6	131.3
1927	18.4	37.7	69.5	94.6	112.4
1928	11.0	28.0	45.8	57.4	76.4
1929	14.1	36.8	55.9	82.7	121.2
1930	7.8	12.8	22.4	37.6	...
1931	9.1	19.7	32.3	...	...
1932	4.5	11.8	...	...	...
1933	6.2	...	...	...	...

ings, which were particularly poor at a number of the mills, will have then disappeared from the record.

Figure 3 shows diagrammatically the comparative performances of the mills on the basis of the same data underlying Fig. 2, except that average traffic density factors have been introduced into the final computations. No claim is made for the entire accuracy of this system

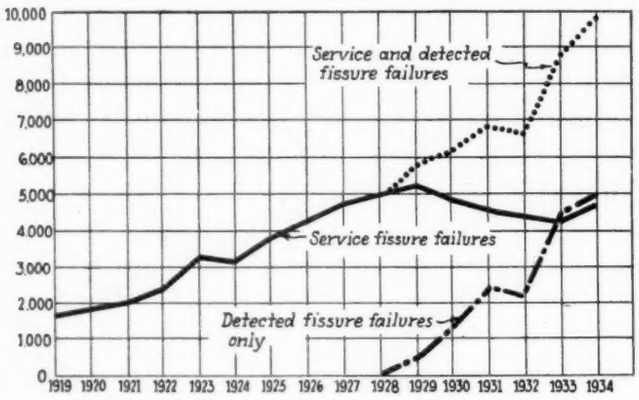


Fig. 4. Total Fissure Failures Reported Each Year

of rating but it does give more consideration to the work which the failed rails from the various mills were called upon to perform than does the system of rating on which Fig. 2 is based.

Transverse Fissure Statistics

The statistics on transverse fissures constitute a cumulative record of 85,283 transverse fissure failures that have been reported up to and including December 31, 1934. They include all fissured rails reported, whether located by actual breakage in track or detected before breakage by inspection or test. This total, however, does not represent all such failures that have occurred for the reason that, while the records of some roads have been cumulative for 20 years, those of other roads are of more recent origin and, furthermore, some roads do not report such failures.

The accumulated grand total of transverse fissure failures, including both service and detected failures, up to December 31, 1934, of all roads that report consistently, was 79,305, which represents an addition for the year

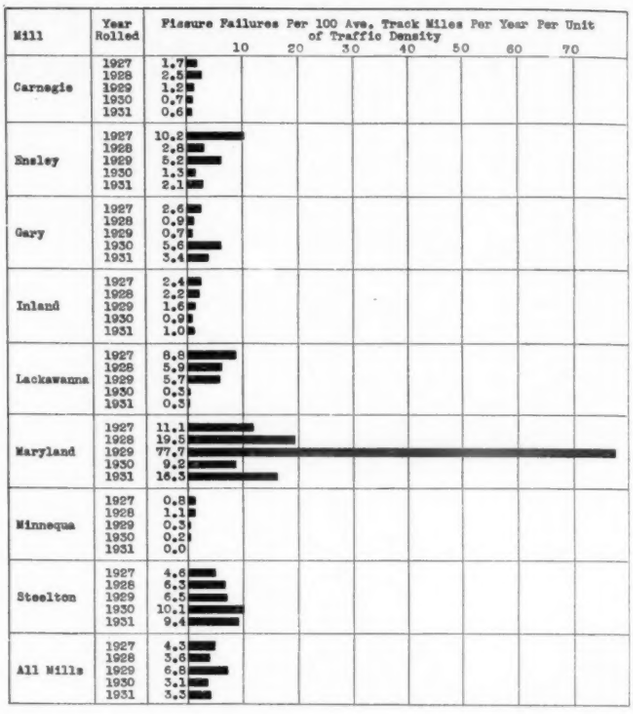
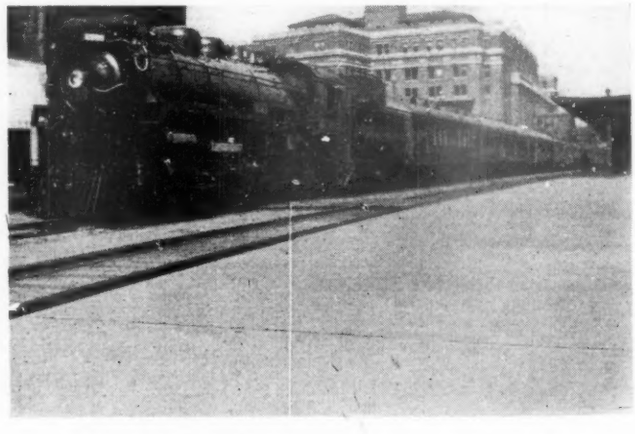


Fig. 5. Fissure Failure Rates (Service and Detected Combined) from Date Rolled to December 31, 1934, by Mills, Altered by Traffic Density Factors

on these roads of 9,820 failures, of which 4,785 occurred in service and 5,034 were detected. The number of transverse fissure failures occurring on these roads in 1934 represents a total increase of 1,106 failures as compared with the 8,714 failures that were reported in 1933. This increase is comprised of 592 service and 514 detected failures.

Fig. 4 presents graphically the total fissure failures reported each year. The dotted line includes detected failures while the solid line excludes them. The broken line indicates detected fissure failures only. It is noteworthy that the steady downward trend in the number of service failures which began in 1930 was terminated by the rather sharp increase that took place in 1934. In Fig. 5 the ratings of the various mills are shown graphically in terms of the number of fissure failures per 100 average track miles per year taking place in the rollings of the years 1927-31, inclusive. The figures given in this compilation were obtained by the application of average traffic density factors to the actual number of failures.

* * *



A Canadian Pacific Train About to Leave Vancouver, B. C.

The Railroads at the Texas Centennial

THE importance of the railroads in the development of Texas during the last century is depicted in the railroad exhibits at the Texas Centennial Exposition which opened at Dallas, Tex., on June 6 and will continue to November 1. These exhibits of nine railroads and the Railway Express Agency are housed in the Transportation Building, one of the most outstanding architectural designs of the exposition. The railroad exhibits likewise are well arranged and are attracting much attention.

The Texas & Pacific is using a model train system to show the areas served by the Sunshine Special, the Louisiana Limited, the Texan and Texas & Pacific freight trains. It is in the form of a large semi-circle, with the New Orleans district on one side and El Paso on the other. A water scene of the harbor district of New Orleans is incorporated in the exhibit, showing in still-life models steamers plying up the river, landing at

Missouri Pacific Exhibit

docks and unloading. The exhibit circles around the display space to include Shreveport, Dallas, Fort Worth and the cattle country beyond, which is depicted with herds of miniature cows grazing. Also shown is the oil field sector served by the T. & P., with tiny oil wells and rigs, trucks and houses.

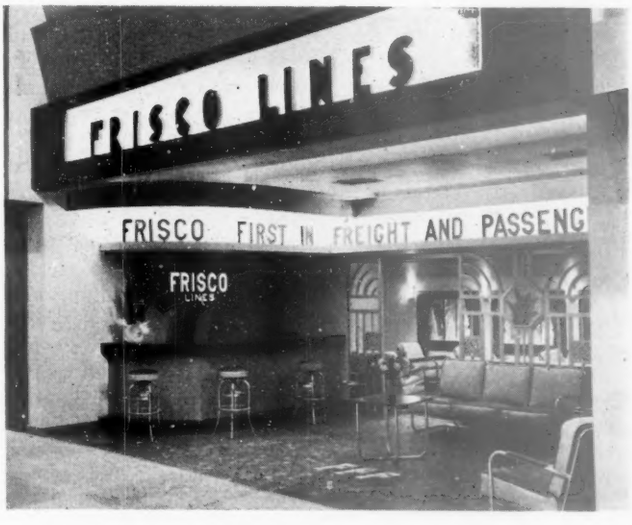
A sign over the entrance to the Missouri Pacific Exhibit reads, "Air conditioned like all Missouri Pacific trains," and as one approaches the entrance enclosure a photo-electric cell automatically opens the door. Another sign used in advertising the Sunshine Special reads, "It's 70 deg. in the Sunshine when it's 100 deg. in the shade!" A large pictorial map of the United States occupies the entire rear wall of the exhibit space. On it, lines of vari-colored neon tubes designate the various routes of the railroad. Illustrations on the map point out the characteristics of each locality. In addition, display cases on the side walls show the various products of the country served. Toggle switches are placed in front of the map on an instrument board so that visitors may illuminate the various points included.

An Atchison, Topeka & Santa Fe Indian village presents an elaborate reproduction of an Indian council house which measures 60 ft. by 140 ft., and is complete in every detail. Inside is a large diorama of the Santa Fe country. Model trains under the supervision of a

Santa Fe Indian Building

regulation train dispatcher move over tiny tracks. The entire back wall is covered with a large oil painting which portrays the typical country that can be seen from Santa Fe coach windows. Adding to the effect of realism is the skillful planting of desert shrubs and wild flowers on the diorama itself. Traffic is controlled under the supervision of the dispatcher's desk which is placed in a central position so that visitors may watch him at his work of directing the miniature trains over the Santa Fe system. The various cities in which the Santa Fe maintains offices are shown principally by replicas of Sana Fe skyscrapers and the associated union depot or terminal of that particular city. For better observation of this exhibit, a balcony has been erected within the walls of the Indian house. Visitors may ascend to the balcony and watch the intricate operation of trains over the system. Numerous tunnels, bridges and loading depots accentuate the realism of this display. A sulphur-loading depot is featured, into which freight trains pull regularly, then travel over their route to the shipping docks at Galveston or other water points, where the sulphur is loaded onto boats for world wide distribution.

In the Missouri-Kansas-Texas exhibit is an information booth. Behind the booth is a model train assembly and behind this is a large illuminated map of the United States with the states served by the "Katy" completely illuminated. Prominence is given the names of the principal Katy trains and the states served. A diorama features the operation of the trains, with automatic block signaling functioning. Baloptic units throw scenes of the countryside along the major routes onto a small

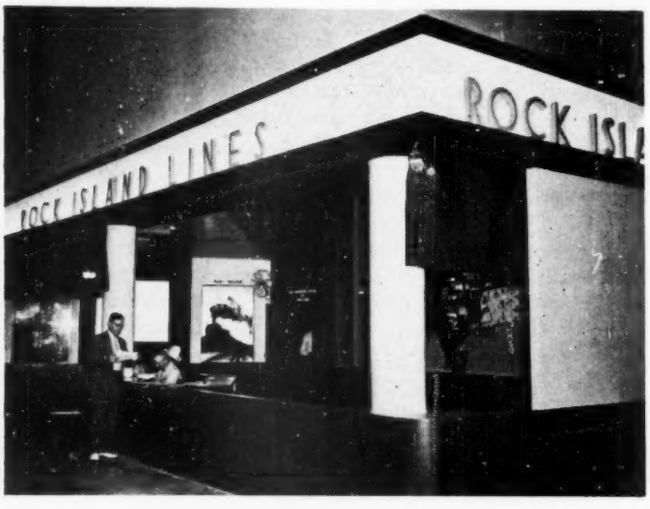


The Frisco Exhibit

screen to give visitors an idea of the interesting views seen while traveling via the Katy.

In the St. Louis-San Francisco exhibit the visitor experiences a synthetic train-ride. Entering a booth, one sits down in what closely resembles the chairs of a Frisco lounge car. As one looks through the windows, he sees passing scenes pictorialized on a moving canvas. These scenes are representative of the country traversed by the Frisco. On the side wall of the booth, a map shows the 5,100 miles of track comprising the Frisco system.

Occupying the center of the floor of the Railway Express Agency space is a six foot model of a regulation express refrigerator car. The various types of express service are shown through the medium of a model of a Pan American Clipper plane with emphasis being given to the mail and express compartment in it. A series of oil paintings surrounding the walls of this booth depict the evolution of the express, starting with the century old Pony Express, carrying through the



Rock Island Exhibit

stage coach era, early day railroad express, and down to the present day rural express, oceanic express and regulation railway express services.

The Chicago, Rock Island & Pacific features a map of the United States with the Rock Island sector illuminated. A moving picture space shows talking pictures of all the national parks and of the Minnesota Arrow Head country. A baloptican unit is employed on the side wall to depict typical operation scenes of the system. This map is connected with an illuminated time table placed at its side, a synchronizing switch illuminating certain high lighted points on the map and corresponding names and time table figures on the time table at the side. With this arrangement, one is able to realize how short a time is required to travel from Texas to the Arrow Head section of Minnesota.

The Southern Pacific exhibit comprises a huge colored picture, sectionalized on the back wall to show scenes in the Southern Pacific territory. Each picture is approximately two feet wide and three feet long, and the entire display presents a vista of famous scenic points of the entire country. The routes of the Southern Pacific are shown over the group by using differently colored lighted buttons. The legends and unusual facts developed from the covering of the route are given with a phonographic record and loud speaker hookup. This arrangement tells in graphic language the story of the building of each of the Southern Pacific routes and the beauty of the scenic areas through which they pass.

The exhibit of the Chicago, Burlington & Quincy, and its subsidiaries, the Colorado & Southern and the Ft. Worth & Denver City, centers around a motion picture theatre. It is air conditioned, "just like all Burlington trains." Its exterior is fashioned to represent a Burlington Zephyr, one side depicting the power unit of the train and the other side representing the rear car of the train. The interior seats 200 people. The show is of 15 min. duration and is a sound picture of scenes taken along some of the more scenic routes of the Burlington, including four of the National Park systems.

The St. Louis-Southwestern Lines exhibit features a map of the United States, with the state of Texas outline elevated slightly on a rotating peg which has Texarkana on its axis. An illuminated map shows the route traversed by the principal Cotton Belt trains, while a frieze of roses from Tyler, Tex., "the Rose Garden of America," decorates the sides and lower front of this map.

In addition to the railroads, several railroad supply companies are exhibiting in the Transportation Building. These include the International Harvester Company, the Bethlehem Steel Company and the Union Wire Rope Corporation.

Claim Agents Survey Performance and Problems

THAT personal injury and death claims have reached a low mark as a result of organized effort was revealed at the forty-seventh annual meeting of the Association of Railway Claim Agents, at St. Paul, Minn., on June 17 to 19. The program of this meeting, over which President Herbert A. Rowe, manager of the claims department of the Delaware, Lackawanna & Western, presided, dealt not only with the progress made in reducing the payments but included discussions to further improve claim agency work. Among the topics discussed were: The Duties of the Claim Adjuster, the Handling of Employee Claims, the Treatment of Fractures, Expert Testimony and the Handling of Suits. In addition, Carl R. Gray, Jr., vice-president and general manager of the Chicago, St. Paul, Minneapolis & Omaha, as the principal speaker, discussed the progress which railroad safety work has made in reducing accidents since its beginning in 1906, saying that new high speed operation is being accomplished with the same degree of safety as accompanied previous slower operation.

Officers elected at the meeting, which was attended by 300 representatives of the railroads, are as follows: President, F. D. Fauser, general claims attorney of the Wabash; vice presidents, P. M. Gatch, general claims attorney of the Illinois Central; R. E. Keck, general claim agent of the Northern Pacific and George B. Patton, claim agent of the Chicago, Indianapolis & Louisville; and secretary-treasurer, F. L. Johnson, chief clerk and claim agent of the Alton, re-elected.

Cincinnati was selected as the place of the next meeting, which will probably be held in the third week in May.

The progress made by members of the association and the present and future problems of claim agency were described by President Rowe in the president's annual address. "In 1935," he said, "we had but 555 employees killed upon our railroads. But for the inspiration of Ralph Richards and our perspicacity in fostering his

great work, there might have been 4,500 such employees killed in 1935, as there were in 1907, and 87,000 serious injuries and amputations instead of the 16,000 which did occur last year. And how should we of the claim department have fared financially from such a score in effecting settlements based upon present day appraisals of recompense for the loss of human life and suitable compensation for mutilations and injuries? It is not too great a stretch of the imagination to say that the personal injury bill might well have been seven times the $22,000,000 expended in 1935."

Mr. Rowe also summarized the development of practices, from the application of common law down to the present day when workmen's compensation acts and the assumption of the role of arbiter by justices of courts complicate claim settlements. "I am not gifted with prescience," he said, "but can see the trend whereby the blind, the halt, the maimed and those whose years have carried them beyond the fullness of vigor, will find it increasingly difficult to secure gainful occupations, and where the last employer will be obliged to maintain the disqualified employee in a social state equivalent to that afforded by the last employment or better. In many states workmen's compensation acts are being extended to include all occupational diseases. The claim department's opportunity to co-operate practically with or assume direction of accident prevention agencies, is a real one."

Frank Wenter, Jr., general claim agent of the Chicago & North Western, reported that compensation legislation in the various state legislatures has undergone a considerable number of changes and additions. The states of Florida and South Carolina passed compensation acts during the year, which leaves only the states of Arkansas and Mississippi without such acts.

The grade crossing committee, of which Mr. Rowe is chairman, reported an increase in the number of persons killed and injured, the total for 1935 being 1,680 killed and 4,658 injured, as compared with 1,554 and 4,300 respectively in 1934. A radical change, according to the report, is taking place in the grade crossing problem. The number of vehicles crossing the railroads at grade is immeasurably greater than the number of trains crossing highways. The elimination of grade crossings in the past was to an extent for the benefit of the railroads. At present the major benefit is for the public. To reduce grade crossing accidents the report recommended that every member of the claim department actively engage in accident prevention work, that all men employed to protect grade crossings have sufficient intelligence, alertness and physical ability to fill this important position properly, that frequent efficiency tests be made at grade crossings to see that the crossing man properly and safely protects the crossing, that crossing gates and other equipment properly function, that proper warnings are given by the approaching trains and that inspections be made to determine whether the conditions at the crossing can be bettered as to view.

Among the technical topics discussed at the meeting were: The Claim Adjuster, by H. K. Lockwood, trial attorney of the Atchison, Topeka & Santa Fe; Equitable Handling of Employee Claims, by R. O. Carter, claim agent of the Missouri-Kansas-Texas; Facts and Probabilities and Appraisement of Cases, by Frank A. Hruska, chief claim agent of the New York Central; Federal Jurisdiction in Safety Appliance Cases Outside of Interstate Transportation, by Edward C. Craig, general counsel of the Illinois Central; Treatment of Fractures, by Dr. Roscoe C. Webb, chief surgeon of the Great Northern; Psychology and Its Application in Claim Agency, by Dr. Udo Wile of the University of Michigan; Expert Testimony, by Benton S. Oppenheimer, attorney for the New York Central, the Baltimore & Ohio and the Southern; Cultivating Friendly Relations Before and After Injury, by J. E. Mathieu, district claim agent of the Chicago & North Western and Our Association and Its Values, by John S. Douglass, general claim agent of the Gulf, Colorado & Santa Fe.

Freight Car Loading

WASHINGTON, D. C.

REVENUE freight car loading in the week ended June 13 totaled 686,812 cars, a decrease of 9,033 cars as compared with the total for the previous week but an increase of 34,701 cars, or 5.3 per cent, as compared with the corresponding week of last year. Coal loading showed a decrease of 51,818 cars as compared with the corresponding week of last year, but all other commodity classifications showed increases. The summary, as compiled by the Car Service Division of the Association of American Railroads, follows:

Revenue Freight Car Loading

For Week Ended Saturday, June 13

Districts	1936	1935	1934
Eastern	148,638	149,269	137,656
Allegheny	137,819	136,047	125,607
Pocahontas	46,236	52,774	42,203
Southern	94,300	90,828	83,530
Northwestern	110,019	88,126	90,932
Central Western	96,712	87,733	90,133
Southwestern	53,088	47,334	48,820
Total Western Districts	259,819	223,193	229,885
Total All Roads	686,812	652,111	618,881
Commodities			
Grain and Grain Products	32,108	25,848	33,806
Live Stock	10,727	10,344	12,812
Coal	105,332	157,150	97,347
Coke	8,477	6,352	6,827
Forest Products	33,642	26,482	25,118
Ore	49,954	33,001	33,924
Merchandise L.C.L.	161,424	156,565	161,453
Miscellaneous	285,148	236,369	247,594
June 13	686,812	652,111	618,881
June 6	695,845	629,712	616,768
May 30	646,859	562,682	579,656
May 23	683,406	598,396	625,990
May 16	681,447	582,950	612,331
Cumulative Total, 24 Weeks	15,186,515	13,976,817	14,167,298

Car Loading in Canada

Car loadings in Canada for the week ended June 13 totaled 45,920, an increase of 194 cars over the corresponding week last year and of 959 cars over the previous week's total, according to the summary of the Dominion Bureau of Statistics.

	Total Cars Loaded	Total Cars Rec'd from Connections
Totals for Canada:		
June 13, 1936	45,920	22,385
June 6, 1936	44,961	22,867
May 30, 1936	40,241	23,776
June 15, 1935	45,726	21,510
Cumulative Totals for Canada:		
June 13, 1936	1,033,056	566,601
June 15, 1935	1,024,969	538,244
June 16, 1934	1,003,733	560,445

THE GREAT WESTERN OF GREAT BRITAIN has recently named one of its locomotives "King Edward VIII" in honor of the present British monarch. This action is said to be in line with the Great Western's policy of naming locomotives of the "King" class in honor of "famous sovereigns of England." The "King Edward VIII" is described as "one of the most modern and powerful of passenger locomotives, of the four cylinder type." It is assigned to the road's principal passenger trains, including the "Cornish Riviera Limited" and the "Bristolian."

Mechanical Division Holds Meeting at Chicago

Fifteenth annual meeting devotes Thursday and Friday morning to discussion of committee reports

THE Mechanical Division of the Operations and Maintenance Department, Association of American Railroads, held its fifteenth annual meeting at the Congress hotel, Chicago, Thursday and Friday, June 25 and 26. The meeting was called to order by Chairman O. A. Garber, chief mechanical officer, Missouri Pacific. Before proceeding with the program the members stood in silent respect to the memory of W. G. Black, vice-president, Chesapeake & Ohio, whose recent death deprived the Mechanical Division of its vice-chairman.

The General Committee presented the usual review of important events of the year, of its own actions and of the status of various matters now pending before the division, or in which it is involved. The report was formally approved by vote of the members present.

In reporting that at a meeting of the Board of Directors of the Association of American Railroads held on March 27, 1936, it was decided that the effective date of interchange Rule 3, Sec. (t), Par. (4), for the retirement of arch-bar trucks, would not be extended beyond January 1, 1936, the committee reported that at the end of last year there remained 568,032 railroad-owned interchange freight cars and 96,624 private line cars, or a total of 664,676 freight cars, amounting to 29.1 per cent, equipped with arch-bar trucks. The committee presented an estimate that approximately 588,500 cars so equipped would still remain in service at the end of June this year.

The committee also reported that 5,420 railroad-owned and 3,079 private line cars were equipped with AB brakes as of March 31, 1936.

The report announced that the Locomotive Service Brotherhoods have completed the presentation of evidence before the Interstate Commerce Commission in their request for an order to require the application of mechanical stokers on all coal-burning locomotives, and that the railroads will start the presentation of their case on July 6. In the rehearing before the commission in connection with a complaint of the locomotive service brotherhoods asking for the application of power reverse gears on all steam locomotives, the committee announced that the rehearing was concluded on March 5 and that a brief for the railroads is being filed with the commission by the general council of the association.

During the opening session the division was addressed briefly by Assistant Chief Inspector Shirley, of the Bureau of Locomotive Inspection, Interstate Commerce Commission, Roy V. Wright, managing editor, *Railway Age*, L. W. Wallace, director, Division of Equipment Research, A.A.R., and A. G. Pack, formerly chief inspector, Bureau of Locomotive Inspection.

Mr. Shirley indicated the importance, in the interests of safety, of having the front cab windows securely fastened with bolts, instead of screws; also the use of shatter-proof glass in these windows. Snow and ice on the windows obscure vision in winter weather. Plenty of heat is available in the cab and measures should be taken to heat the windows and prevent ice forming on them. The engineman's compartment on other than steam locomotives is frequently too cold in winter, and particularly so where metal floors are used. Means should be provided for insuring the maintenance of a reasonable degree of heat in such compartments. Steps should also be taken, he said, by the use of insulation or other measures, to eliminate the deafening noise in the cabs of other than steam locomotives.

In his remarks Mr. Wright congratulated the members of the Mechanical Division on the extraordinary way in which they had met the conditions created by the depression during the past few years. This applied, he said, not alone to the ingenuity with which they had increased the efficiency of their operations, but to progress made in the utilization of new materials and new types of equipment which have recently been developed. Two new challenges now confront the mechanical department officers and supervisors, said Mr. Wright. These are the problems in connection with the speeding up of both passenger and freight service to meet the new forms of competition and the problem of personnel training which the present depleted state of the mechanical-department forces has created. This, he said, required a renewed interest in apprenticeship and building up and educating the supervision within the department. In the latter connection, Mr. Wright expressed the hope that, with a continuance of the improvement in business conditions, next year might see a return to a convention with a large exhibit of the many new and improved features of equipment never before exhibited. This, he said, would afford an invaluable means of education for these men as well as for all railway officers.

L. W. Wallace explained his conception of the primary function of the Division of Equipment Research in developing data and investigating current problems which arise from time to time in connection with railway equipment. He stated that the division, of which he is the head, desires to supplement, and in no way to supplant, the work of the various committees of the Mechanical Division. The Division of Equipment Research has already cooperated with the Committee on Car Construction in connection with impact tests of the Pullman welded steel box car and has advised the Committee on Locomotive Construction regarding two or three proposed studies. Mr. Wallace solicited further opportunities to assist the Mechanical Division committees in securing engineering data, arranging programs of test procedure, developing estimates of cost and in every other way which may prove feasible. Mr. Wallace closed his remarks by outlining the general procedure and program of the present investigation of air conditioning and stated that 23 out of 30 railroads have already assigned special engineers to make

an intensive study of railway air conditioning requirements and assist in the road tests which must be made before any final conclusions are drawn.

New Chairman Elected

Owing to the death of W. G. Black, vice-president, Chesapeake & Ohio, whom the Nominating Committee had proposed in its formal report as the candidate for the chairmanship for the ensuing two years, the committee named J. W. Burnett, general superintendent of motive power and machinery, Union Pacific System, for chairman and proposed no candidate for vice-chairman at this time. Mr. Burnett and the following members of the General Committee, to serve until June, 1938, were elected: F. W. Hankins, chief of motive power, Pennsylvania; R. G. Henley, superintendent of motive power, Norfolk & Western; F. R. Mays, general superintendent of motive power, Illinois Central; J. Purcell, assistant to vice-president, Atchison, Topeka & Santa Fe; A. L. Ralston, general mechanical superintendent, New York, New Haven & Hartford. O. A. Garber, the retiring chairman, was also elected to serve on the General Committee during the next two years.

O. A. Garber, Chairman

J. W. Burnett, Chairman-elect

V. R. Hawthorne Secretary

Report on Brakes and Brake Equipment

The following report is submitted for consideration:

Braking Ratios for Passenger Cars

This subject has been discussed with the Mechanical Advisory Committee of the Federal Co-ordinator of Transportation, the Director, Bureau of Safety, I. C. C., and representatives of the Westinghouse and New York Air Brake Companies, after which the following conclusions have been reached:

Braking ratios for passenger equipment cars be divided into two separate and distinct types of equipment.

A—That dealing with conventional passenger equipment cars.

B—That dealing with specially designed light-weight passenger equipment cars for and other cars operated in ultra-high speed service.

For *A* we recommend as a minimum requirement the present standard A. A. R. recommended practice which is a braking ratio of 90 per cent of the empty car weight based on 60 lb. brake cylinder pressure.

For *B* higher braking ratios than specified in *A* for conventional equipment are necessary, but, in view of the limited knowledge with respect to the necessary practical braking ratio requirements for such equipment, it is obvious that data not yet available will be necessary before definite minimum requirement can be established.

We also recommend that the present braking ratios for passenger cars as shown on page 7—Sec. E of the Manual, be advanced to standard with a revision to the caption inserting the word "Conventional" between the words "For" and "Passenger."

Braking Ratios for Locomotives

We have also agreed that these braking ratios be divided into two separate and distinct types of locomotives.

C—That dealing with conventional locomotives.

D—That dealing with locomotives designed for and other locomotives operated in ultra-high-speed service.

For *C* we recommend the following minimum braking ratios, all based on 50 lb. brake cylinder pressure:

	Passenger	Freight and Switch
Drivers	60 per cent	50 per cent
Trucks	45 per cent	45 per cent
Trailer	45 per cent	45 per cent
Tender	90 per cent	75 per cent

For *D* higher braking ratios than specified in *C* for conventional locomotives are necessary, but in view of the limited knowledge with respect to the necessary practical braking ratio requirements for such lomomotives it is obvious that data not yet available will be necessary before any definite minimum can be established.

We further recommend that the locombtive braking ratios

for conventional locomotives be adopted as recommended practice and included in the Manual.

With reference to *B* and *D*. It was the opinion that road tests would be necessary before definite minimum braking ratios could be established for ultra-high speed passenger cars and locomotives, and it was decided that the committee would request the brake companies to prepare a tentative program of road tests and assist the subcommittee with its final preparation for recommendation.

Hose Nipples

Sometime ago this committee conducted an investigation in connection with air hose failures, which disclosed that as a rule burst hose resulted from manufacturers' defects or damage to the inner tubing, especially in mounting.

The question is now raised as to whether the use of former standard long nipples for 1⅜-in. air brake hose should be perpetuated or if they should be scrapped when hose are remounted and the present A. A. R. standard nipple used exclusively. The purpose of shortening the nipple and changing the contour at the non-threaded end was to minimize damage to hose tubing when hose are pulled apart without uncoupling.

The greater proportion of the above size nipples in service are of the present A. A. R. type and we are of the opinion that the results obtained from the use of the present standard justifies their substitution for the former long nipples in remounting air brake hose and recommend that the railroads consider making effective the general use of the standard short nipple.

Air Brake Defect Card

Your committee feels that the demand for the defect card shown in the Manual does not exist at present and that its use has been generally discontinued, therefore, we recommend its removal from page E-9—1934, and all references thereto.

Lap-Joint Packing Rings for Triple Valves

Rule 134 in "Instructions for the Maintenance of Air Brakes and Train Air Signal Equipment" provides that main piston packing rings removed from the piston must not be re-applied. This rule was inaugurated at a time when the old type mitre-joint ring was the standard and was to prevent the re-use of rings which it was necessary to distort in using them in smaller sized cylinders in order that excessive clearance of the joint did not occur. In recent years the air brake companies have developed a new type lap-joint ring which has largely supplanted the above mentioned type and provision is made in the various sizes furnished for suitable clearance at the joint to prevent jamming of the ring ends, which resulted with the old type ring in an effort to fit the joints close enough to prevent ring leakage.

The new type ring has a specially designed lap joint which provides for considerable clearance at the joint without leakage, and within the limits of the permissible joint clearance may be re-applied. The air brake companies are now developing a gage to determine the suitability of rings of this type for re-application, after which it is our intention to recommend a modification of the above mentioned rule in accordance therewith.

Location of "AB" Brake Equipment

Numerous complaints have reached your committee relative to damage to "AB" control valves, particularly on house cars, due to end gates on trucks protruding under cars when backing up for loading and unloading, and hitting the "AB" valve located under or adjacent to the door opening. In conjunction with the Car Construction Committee arrangements have been made to revise Plate 516-A of the supplement to the Manual to provide for the "AB" valve being located at least 24 in. from one side of the door opening. When the width of the door opening or other structural condition makes this impossible, we recommend a substantial shield to protect the valve.

Braking Ratio for Light-Weight Freight Cars

Braking ratios for light-weight, high-capacity freight cars has been considered by a sub-committee and after discussions with the air brake companies and the Mechanical Advisory Committee to the Federal Co-ordinator of Transportation, it was agreed that the tentative recommendations for braking ratios of light-weight cars was satisfactory.

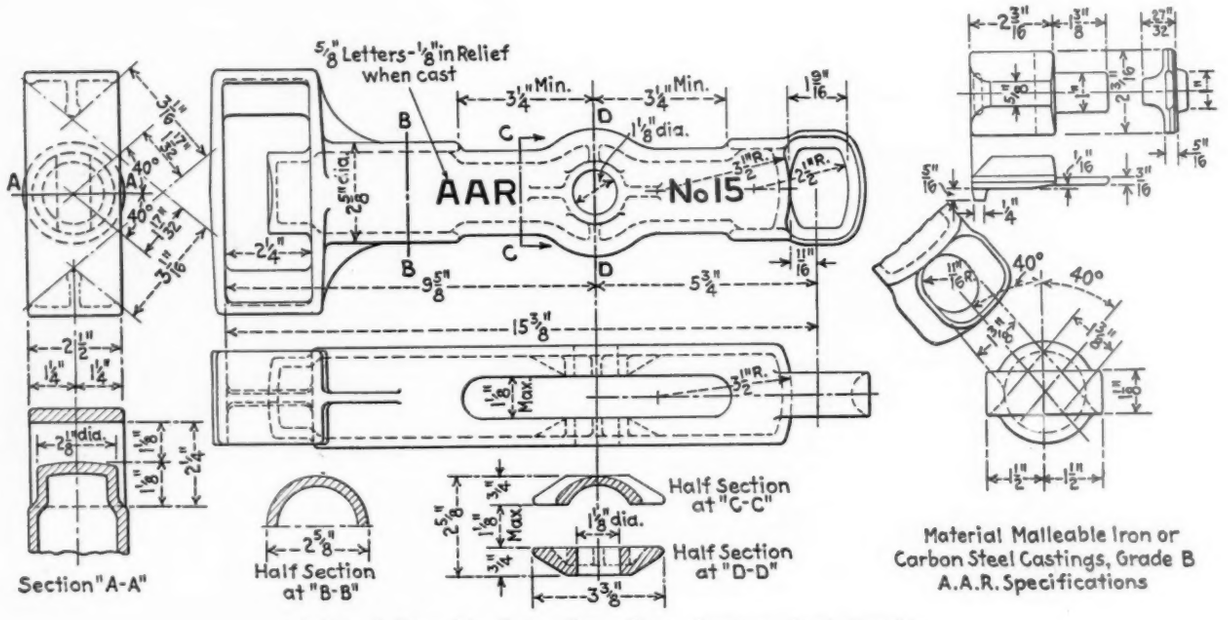
In view of this action we recommend the following braking ratios for new freight cars:

"The braking ratio for freight cars equipped with empty-and-load brakes shall be not more than 60 per cent of the light weight of car based upon 50 lb. brake cylinder pressure.

"The braking ratio of such loaded cars shall be 30 per cent of the marked nominal carrying capacity plus the light weight of the car, based upon 50 lb. brake cylinder pressure.

"When the marked nominal carrying capacity of freight cars is more than three times the light weight, such cars shall be equipped with an approved design of empty and load brake."

We further recommend that the above requirements be adopted as recommended practice and embodied in the Manual.


5/8" Letters-1/8" in Relief when cast
AAR
No 15
Section "A-A"
Half Section at "B-B"
Half Section at "C-C"
Half Section at "D-D"
Material Malleable Iron or Carbon Steel Castings, Grade B A.A.R. Specifications

Approved Reversible Brake Beam Strut—American Steel Foundries

Brake Beams

Maintenance and Inspection of Beams and Attachments.—During the past winter numerous complaints have been received relative to failures of brake beams, hangers and attachments, brake beam supports, bottom rods, etc., which have, in many instances, resulted in considerable delay and interruption to traffic. The unprecedented weather throughout the past winter has, no doubt, aggravated this situation; however, an inspection of these items would indicate that roads generally should establish a suitable campaign in inspection and repairs to these devices in order that hanger pins, bolts, cotters, keepers and various supporting members will be carefully inspected and such corrections made as will relieve this situation.

In many instances improper size and poorly made bolts, pins and cotter keys or keepers are found and the lack of their proper anchoring by spreading so that they are secure to avoid wear

and loss. Poor materials and workmanship are common in the fabrication of many hangers, pins, safety supports, etc., which leads to their rapid failure in service.

The committee feels that this is of such importance that greater care should be exercised and closer inspection given the fabrication of all parts comprising the truck foundation brake gear and suggests the application of designs and materials which offer the greatest security to long life and absence of failure.

Numerous failures have been traced directly to brake hangers, pins and materials used in bolts, rivets, etc., which have been found badly burned and fractured during manufacture. Close observance should be given to the requirements of present Interchange Rules regarding inspection of the above items when repairs or renewals are made.

The loop type of brake hanger eliminates the necessity for hanger pins, cotter keys or keepers and we urge the use of this type hanger so far as possible.

In order that the matter might be brought to the attention of the entire membership, the committee has, at the request of the General Committee, suggested a circular for general distribution and we urge the railroads to observe the recommendations contained therein in order to alleviate, as far as possible, the troubles incident to lack of maintenance of foundation brake gear upon freight equipment.

Specifications for Repairs to Brake Beams.—During the early part o last year a joint subcommittee representing the Arbitration, Car Construction and Brake Equipment Committees, began the preparation of specifications for repairs to freight brake beams. This joint subcommittee has prepared and submits herewith a Specification for Repairs to Freight Equipment Brake Beams which, it is felt, will result in a reconditoned beam of reasonable satisfactory service life expectancy and which will eliminate many failures now experienced as result of secondhand brake beam applications.

[Specifications which were included in Exhibit A of the report are omitted in the abstract.—EDITOR]

A cost work-up of beams repaired under the new specification indicates the present secondhand allowance of 65 per cent of price new, should be increased to 70 per cent of price new for specification repaired beams; and the average credit value reduced from 30 per cent to 23 per cent of price new.

If the specification is adopted as Standard Practice, it is recommended that the Arbitration Committee modify the Interchange Code to provide prices for new beams, for repaired beams per Standard Specification and Test and for average credit value —in lieu of the present new, secondhand and average credit allowances. Also, to provide that secondhand beams which have not been repaired in accordance with the specification, if applied to foreign cars, shall be charged at the average credit allowance.

The proposed specifications have been approved by the Arbitration Committee, Committee on Car Construction and Committee on Brakes and Brake Equipment, with recommendation that same be submitted to letter ballot for adoption as Standard Practice, Effective January 1, 1937.

Reversible Brake Beam Struts or Fulcrums.—Repeated requests have been made for approval of reversible struts of various types. Recently the American Steel Foundries submitted a reversible strut suitable for the No. 15 A. A. R. standard brake beam. A strut of this character provides for the elimination of one brake beam, i.e., right or left hand, from the stock of beams necessary to carry to take care of repairs to freight equipment and at the same time embodies a one-piece strut possessing the strength and rigidity common to that of the present standard strut.

The committee have given its approval for the use of this strut to encourage, so far as possible, the standardization of brake beams and related parts.

The report was signed by G. H. Wood (chairman), supervisor air brakes, A. T. & S. F.; W. H. Clegg (vice chairman), chief inspector air brakes and car heating equipment, Can. Nat.; R. E. Baker, general air brake inspector, B. & M.; T. L. Burton, air brake engineer, N. Y. C.; M. Purcell, general air brake inspector, No. Pac.; C. H. Rawlings, general air brake instructor, D. & R. G. W.; M. A. Kinney, general master mechanic, C. & O.; R. C. Burns, general foreman, Penna.; L. S. Ayer, general air brake inspector, So. Pac., and J. P. Stewart, general supervisor air brakes, Mo. Pac.

Discussion

J. W. Burnett, Union Pacific, offered the committee the extensive data on the brake performance which has been developed from tests of the high-speed trains on that road. This the committee was glad to accept.

R. L. Kleine, Pennsylvania, questioned the desirability of prohibiting the restoration of worn surfaces of brake heads by welding, which was the apparent intent of Paragraph (c) of Section III of the Specifications for Repairs to Freight Equipment Brake Beams, in exhibit A of the Committee Report. He said that no trouble had been experienced with brake heads of malleable iron and steel restored in this way. J. McMullen, Erie, was not in favor of the use of welded brake heads except on home cars. W. H. Clegg, Canadian National, said that, while some welding was good, not all of that done around car departments was satisfactory. Considering the price of new brake heads, he did not consider the economy was great enough to justify permitting the welded brake heads to be used on other than system cars. On motion of Mr. Kleine, the paragraph of the Specifications in question was referred back to the committee to be revised to specify limits of wear within which welding is permissible.

Action—Subject to the above change, the report was accepted and referred to letter ballot.

Report on Safety Appliances

Standard specifications covering geared hand brakes, as recommended by the Committee on Brakes and Brake Equipment, and the Committee on Car Construction, were approved for standard practice by letter ballot, December 18, 1935, to become effective March 1, 1936.

Automatic Train Line Connectors

The Joint Committee on Automatic Train Line Connectors of the Operating and Mechanical Divisions, at a meeting on September 10, 1935, unanimously recommended that laboratory tests of the two connectors that have given the most satisfactory performance under the tests conducted to date be continued to develop the performance of these devices under snow and ice conditions. They also recommended that H. A. Johnson continue as Director of this investigation, and that report covering the tests of the automatic train line connectors will not be made to the member roads of the Association, or to the Interstate Commerce Commission, until after the tests of the two selected devices, under ice and snow conditions, are completed.

H. A. Johnson reported, under date of April 8, 1936, that "The train line connectors which were used in the ice and snow tests in the Monon yards have been taken apart and examined for the effect of weather and the tests which were run on them. Laboratory tests on the oscillating machine were run on the Robinson ball and funnel and the Johnson type passenger train line connectors which have been exposed to weathering conditions since last fall. The tests are now completed and the report is being prepared."

Metal Running Boards

Copies of report covering the inspection and tests of metal running boards, to which was attached a tabulation covering information relative to the weight, cost, maintenance, and life of metal running boards, compared with wooden running boards, were sent to all members of the General Committee and the Committee on Safety Appliances. This report was received as information by the General Committee at its meeting on November 7, 1935.

The report was signed by Chairman R. G. Henley, superintendent motive power, Norfolk & Western; Vice-Chairman F. W. Hankins, chief of motive power, Pennsylvania; C. J. Bodemer, superintendent machinery, Louisville & Nashville; F. H. Hardin, assistant to president, New York Central; J. Purcell, assistant to vice-president, Atchison, Topeka & Santa Fe, and J. J. Tatum, general superintendent car department, Baltimore & Ohio.

Action—The report was accepted.

Report on Specifications for Materials

The committee during the past year has reviewed a number of the specifications and considered comments and criticisms submitted by members of the Association or others.

At the request of the Secretary, this committee has reviewed the action taken by the Purchases and Stores Division in standardizing tinware, and approves this action.

1—Specifications M-101-34, Axles, Carbon Steel, for Cars and Locomotive Tenders.

In paragraph on Workmanship, 9 (b), change the last sentence, which now reads "The rough turning shall be done with a broad-nosed tool so that the surface is free from chatter marks," to read "The rough turning shall be done so that the surface is free from objectionable ridges and chatter marks."

While this wording is somewhat general it is believed that

it will take care of some of the objections that have been raised to the present wording.

2—Specifications M-108-34, Boiler Tubes, Lap-Welded and Seamless Steel and Lap-Welded Charcoal Iron.

The revision of these specifications has been principally to bring them into line with other standard specifications and current practice, but it also seems desirable to expand the scope so as to include electric-resistance-welded tubes which have been put into use by a number of railroads.

3—Specifications M-109-34, Structural Rivet Steel and Structural Rivets.

These specifications have been revised principally to bring the tables of dimensions and tolerances into agreement with those of the American Standards Association and eliminate the steeple headed rivets.

4—Specifications M-110-34, Boiler Rivet Steel and Boiler Rivets.

In order to cover the present practice of cold forming and normalizing of rivet heads used by certain manufacturers, Par. 2 (b) has been changed to read as follows:

"(B) Rivet heads may be hot formed or cold formed and normalized."

5—Specifications M-111-34, Welded and Seamless Steel Pipe.

These specifications have been revised to include electric resistance welded pipe, and provide for test of galvanized pipe.

6—Specifications M-115-34, Boiler and Firebox Steel for Locomotives.

On account of some misinterpretation of the meaning of the carbon range on firebox steel, this has been changed so as to eliminate the minimum.

7—Specifications M-118-34, Coupler and Knuckle Pivot Pins.

On account of the average of the present carbon range 0.55 to 0.75 per cent coming above the limit of 0.60 and thereby causing an extra classification, the carbon range has been changed to read

"0.52 to 0.67 per cent."

8—Specifications M-201-34, Steel Castings.

The following changes are made in order to clarify the meaning of the paragraphs affected.

Par. 14, in the last sentence insert the word *apparently* between *and* and *suitable*, making this read *and apparently suitable*, etc.

Par. 15 (a), change the last sentence to read *or to the dimensions predicated by the pattern*, etc.

9—Specifications M-301-34, Iron and Steel Chain.
M-302-34, Refined Wrought Iron Bars.
M-304-34, Staybolt Iron, Hollow Rolled.
M-305-34, Staybolt Iron, Solid.
M-306-34, Welded Wrought Iron Pipe.

In all of the above specifications change the maximum manganese from 0.05 per cent to read 0.06 per cent. This is in accordance with recent discussion with the wrought iron manufacturers and agreement that the present 0.05 per cent maximum manganese was unduly restrictive.

10—Specifications M-304-34, Staybolt Iron, Hollow Rolled.

Par. 5, *Tension Tests.* Add a new Par. (c), reading as follows:

"(c) In calculating the tensile strength, yield point and reduction of area, the area of a $\frac{7}{32}$-in. hole shall be deducted from the area of the bar."

11—Specifications M-305-34, Staybolt Iron, Solid.

In Par. 5, Tension Tests, insert new paragraphs, (c) and (d), reading as follows:

"(c) For bars $\frac{7}{8}$ in. down to $1\frac{1}{16}$ in. diameter inclusive, a minimum elongation of 28 per cent shall be permitted; for bars $\frac{5}{8}$ in. and less in diameter, a minimum elongation of 25 per cent shall be permitted."

"(d) For bars over $1\frac{1}{4}$ sq. in. in sectional area, the following deductions from the minimum requirements specified in Section 5 (a) shall be made for each square inch of nominal section above $1\frac{1}{4}$ sq. in.:

Tensile strength—250 lb., but not under 46,000 lb. per sq. in.
Reduction of area—3 per cent, but not under 40 per cent.

12—Specifications M-605-34, Steam and Hot Water Hose.

On account of the difference in effect between the rack and the digester test, Par. 8 (b) has been changed to permit somewhat greater deterioration in tensile results when the digester test is used, as follows:

"(b) After the steam test, an increase or decrease of not more than 40 per cent from the original results will be permitted in tensile strength and elongation of tube and cover when the rack test is used, and not more than 50 per cent variation when the digester test is used."

Recommendations

The committee recommended that the above revisions in specifications be approved for submission to letter ballot.

The report was signed by: F. M. Waring (chairman), engineer of tests, Penna.; T. D. Sedwick (vice-chairman), engineer of tests, C.R.I. & P.; C. P. VanGundy, engineer of tests, B. & O.; Frank Zeleny, engineer of tests, C.B. & Q.; H. G. Burnham, engineer of tests, Nor. Pac.; J. C. Ramage, engineer of tests, Southern; H. W. Faus, engineer of tests, N.Y.C.; E. E. Chapman, engineer of tests, A.T. & S.F.; H. P. Hass, engineer of tests, N.Y.N.H. & H.; J. R. Jackson, engineer of tests, Mo. Pac.; H. G. Miller, engineer of tests, C.M.St. P. & P.

Action.—The report was accepted and the recommendations ordered referred to letter ballot.

Report on Electric Rolling Stock

The subjects under consideration by the committee include (1) advantages of anti-friction bearings for electric locomotives and m.u. cars, (2) a summary of experience in steam heating of passenger-train cars while being handled by electric locomotives, (3) methods of treating traction-motor windings for protection and preservation of insulation, (4) the Pennsylvania type GG1 electric locomotive, and (5) electric locomotives placed in service during the year ending June 1936.

Anti-Friction Bearings

A questionnaire was sent to 13 railroads believed to have acquired experience with anti-friction bearings, asking what advantages they offered when used in traction motors, main journals of multiple-unit cars and electric locomotives, with respect to operation, maintenance and conduction of current through parts. A brief summary of the information gathered is, as follows:

"1—Anti-friction bearings on armatures have no apparent effect upon starting friction.

"2—When journals are equipped it is general practice to hold trains at stations with brakes where it was not necessary with plain bearings.

"3—There is no apparent difference in running friction and there has been no effect upon schedules.

"4—No energy saving has occurred.

"5—Only one of the four railroads reporting has had any failure resulting from passage of propulsion current through the bearings and no provision has been made for passage of propulsion current around the bearings.

"6—The information on cost of maintenance and the recommendations for the use of anti-friction bearings are not suitable for comment at this time.

"The committee believes there are one or two other roads which have had considerable experience with anti-friction bearings and it shall continue to seek information on this subject with a view to making a final and definite report next year."

Steam Heating and Air Conditioning

Four railroads submitted summaries of their experience in the steam heating of passenger train cars while being handled by electric locomotives. These included the Chicago, Milwaukee, St. Paul & Pacific, the New York Central, the Pennsylvania and the New York, New Haven & Hartford. The report includes the data supplied by the railroads and these data are summarized by the committee, as follows:

"When passenger train cars are being hauled by steam locomotives there is a large source of supply of steam for car heating purposes in the locomotive boiler. Also this supply is available at high pressure, i.e., in most cases at around 200 lb. per square inch. Through the use of a reducing valve the desired pressure is supplied to the steam train line. In the past when rubber hose connections were practically the universal standard connection between cars the maximum pressure was limited to about 130 lb. per sq. in., since this was the limit the hose could be expected to withstand without premature failure.

"On electric locomotives it is necessary to have a boiler for the sole purpose of supplying steam for train heating or cooling purposes.

"Since the boiler, its auxiliaries, fuel oil tanks, water tanks, etc., take up valuable space in the cab and add weight, thereby making the layout and design of the traction apparatus more difficult and crowded, it is desirable to limit the size of this equipment, if possible, yet keep it adequate to handle the maximum train demand for heating or cooling without restricting the train length below the hauling capacity of the locomotive.

"The early electric locomotive boilers were built to operate at 100 to 120 lb. per sq. in. At that time many wooden cars were in use, trains were short, the connections between cars were rubber hose, the train line 1½-in. or less in some instances, and the gasket opening $1\frac{5}{8}$-in.

"The present practice of the railroads to operate long trains

of 16 or 18 cars or more at higher speeds and at the same time provide better conditions in the cars both in heating and cooling has created demands on the steam supply system that have necessitated revisions in its equipment as follows:

1—The use of a 2-in. train line and 2-in. metallic end connections between cars to permit passage of the required volume of steam with the minimum pressure drop.

2—New boilers being built for electric locomotives are designed for 200 or 220 lb. per sq. in. working pressure to provide sufficient pressure at the rear of long trains for steam heat purposes or air conditioning by the steam system, which requires 60 lb. per sq. in. at the rear car for proper operation. Note: For steam heating purposes only a maximum of 8 to 10 lb. has been considered sufficient at the rear car.

3—Adjustment of locomotive regulators to make possible the supplying of steam to cars at 175 lb. per sq. in. or higher.

4—To minimize drop between boiler and rear of the locomotive, pipe larger than 2 in. has been used in some cases.

5—The use of reducing valves on each car to maintain the pressure constant at the regulator, or the use of diaphragms in regulators capable of efficiently handling steam at all pressures from 0 to 200 lb. This to minimize waste of steam and consequent loss of pressure and capacity to heat the train.

6—Boilers of greater capacity are being provided in the electric locomotives now built. Recent ones have had normal ratings of 3,250 and 4,700 lb. of steam per hour from and at 212 deg. F. Under forced ratings twice this evaporation is available.

"The amount of steam required per car per hour varies with the particular type of car, the speed, the weather conditions, the condition of the train line and regulators with respect to leaks, adjustment, etc., and to the difference between the temperature in the car to the outside air. A fair average figure for design purposes for a car temperature of 70 deg. F. with outside temperature zero, and train line in good condition, is 200-250 lb. per hour. The exact value is dependent on the car insulation and whether the cars have single, double or triple windows, etc.

"For air conditioning by steam, about 250 lb. per hour per car is required. Since the outside air temperature is high when this equipment is used, the condensation losses are a minimum.

"It has been found that well insulated metallic end connectors reduce the loss approximately 10 per cent over uninsulated connectors. Aside from the heat economy standpoint this is the equivalent of an increase in boiler capacity since more cars could be satisfactorily handled by the same boiler. Further the water supply which is necessarily limited on electric locomotives is conserved, making possible longer trains or runs.

"Summarizing, it can be said that experience in heating or cooling of passenger trains being hauled by electric locomotives shows that ability to handle long trains is limited by the pressure available at the rear of the locomotive, train-line pressure conditions, and the capacity of the boiler to produce sufficient quantity of steam."

Treating of Traction-Motor Windings

Various members of the electric rolling stock committee were asked to give an outline of the practice in effect for treatment of traction-motor windings on the equipment under their jurisdiction. Replies received concerned practices on the Virginian, the New York, New Haven & Hartford, the Pennsylvania, the Baltimore & Ohio, the Norfolk & Western, the New York Central and the Chicago, Milwaukee, St. Paul & Pacific. Considering the fact that the methods used are not uniform, and since it was thought that all members of the association would be interested in the various methods used, the information furnished is included in full in the report. On the basis of this information, the committee has drawn the following conclusions:

"From the comments given as representing the practice in effect by the various railroads in treatment of traction-motor windings for protection and preservation of insulation, and as borne out by many years of operating experience by all concerned, the following facts are evident:

"1—Insulation must not be overheated.

"2—Insulation must be kept clean.

"3—Insulation must be kept dry.

"With the accuracy of design now used in practical applications to electric traction problems, electrical equipment will probably not be overheated to the extent that insulation is damaged unless the capacity of the equipment is exceeded.

"Excellent insulation materials and assembly are provided by the manufacturers in traction-motor equipment.

"Suitable cleaning solvents and insulating materials and varnishes are available for traction-motor equipment.

"The problems incident to treating traction-motor windings for protection and preservation of insulation are therefore largely the everyday problems of thorough inspection and maintenance and the application to this work of standards of practice which are fairly well known."

Electric Locomotives

Exhibit No. 4 of the report consists of brief descriptions of the class P5A and class GG1 electric passenger locomotives now in service on the Pennsylvania.

Exhibit No. 5 consists of a table covering electric locomotives placed in service during the year ending June, 1936. These are all Pennsylvania locomotives and consist of two switchers having a C axle arrangement, 27 type P5A passenger locomotives with a 2-C-2 axle arrangement, and 57 type GG1 passenger locomotives having a 2-C + C-2 axle arrangement.

The report is signed by R. G. Henley (chairman), superintendent motive power, N. & W.; J. H. Davis, chief engineer electric traction, B. & O.; J. W. Sasser, superintendent motive power, Virginian; R. Beeuwkes, electrical engineer, C.M.St. P. & P.; W. S. Hamilton, equipment electrical engineer, N.Y.C.; A. L. Ralston, general mechanical superintendent, N.Y.,N.H. & H., and H. C. Griffith, electrical engineer, Pennsylvania.

Action.—The report was accepted and ordered published in the annual proceedings.

Report on Car Construction

The report of the Committee on Car Construction covered a variety of subjects, many of which had been assigned to subcommittees. For certain portions of the report, particularly where progress only was recorded, this abstract has been limited to a concise summary of the committee's work and its suggestions accompanying the report as Appendix A covering alternate designs for standard hopper cars.

Designs of Standard Cars

The report last year outlined the fundamental principles of the program submitted to and approved by the Mechanical Division in 1932, under which your committee since has been cooperating with the Design Committee of the American Railway Car Institute on production of designs for the principal types of freight equipment cars which represented the latest state of the art for weight, cost, construction, strength and general utility, in order that any road might adopt these designs and construct thereto their cars of the types produced.

These designs necessarily are based on the use of non-experimental materials and methods of construction. Further progress in the direction of light-weight alloy steel designs is not interfered with or retarded, however, because the fundamental characteristics thus established may be effectively and advantageously utilized thereon, this being exemplified by the fact that various builders have proceeded accordingly on new designs of light-weight alloy steel cars which have been constructed for test or interchange service.

It seems necessary, however, to repeat the following paragraph from the 1935 report:

Whether or not full advantages are to be derived from progressive standardization of freight equipment depends largely, if not almost entirely, on the attitude and the position taken from this time on by the A. A. R. in the matter of building the standard designs or the still lighter weight units in high-tensile steels or other materials based thereon when cars of these types are required.

It is not our purpose again to discuss the advantages of freight-car standardization or the soundness of the 1932 program, first, because this is a subject which all member roads now should be thoroughly familiar with, and second, for the reason that the efficiency and the economic value of the standard steel-sheathed wood-lined box car from the standpoints of "weight, cost, construction, strength and general utility" have been proved through extensometer, deflectometer and impact tests and finally, by the severe service test on the C. & O. to an extent never before undertaken or approached. It is a significant fact, however, that this steel-sheathed design is the first car to be adopted as Standard by the present A. A. R. or any of its predecessors.

Some member roads not only have supported the standard car principle by voting in the affirmative on the designs presented but have taken advantage of this work by ordering thereto new cars constructed. On the other hand, certain roads have proceeded independently as in the past, while in other cases those requiring new cars have incorporated in their own designs certain A. A. R. features such as the new standard center-sill section, bolster center filler casting, truck center-plate height and hopper and door construction, thus giving practical recognition to the fact that at least these features are preferred to their own.

In order to present an up-to-date picture of the situation with reference to the extent to which the A. A. R. standard designs have been utilized, or if preferred, the extent to which non-standard cars have been built, and keeping in mind the fact that the box car was submitted in 1932 and the 50- and 70-ton hoppers in 1935, a summary (see page 1034) is given, which, although not complete in all details, is substantially correct.

It is not the function of your committee to promote or defend

a procedure advocated by the A. A. R. executives and approved by the Mechanical Division other than to carry out instructions, and we now say that through the skill and co-operation of the A. R. C. I. Design Committee and the efforts of the Car Construction Committee, to date this has been done. The regular work of your committee, however, is becoming more voluminous, diversified and difficult, largely because of the extended activities

Extent to Which Standard Designs Have Been Utilized

Item	Design	No. of cars
	Box and Auto Box Ordered During 1934	
1	A. A. R. throughout	1,750
2	A. A. R. except former standard center sill, but with the 25¾-in. center-plate height	1,550
3	Former A. A. R. tentative design	250
4	Not A. A. R.	6,252
5	Miscellaneous and not investigated	12
	Total	9,814
	Hopper Cars Ordered During 1934	
6	Conforming closely to A. A. R. standard then in process of design	8,500
7	Light-weight alloy steel to basic A. A. R. then being designed	110
8	Not A. A. R.	1,665
9	Miscellaneous and not investigated	12
	Total	10,287
	Box and Auto Box Ordered During 1935	
10	A. A. R. throughout	1,255
11	Not A. A. R. except center sill section and 25¾-in. truck height	510
12	A. A. R. basic design, alloy steel, light weight	2
13	Not A. A. R.	8,305
	Total	10,072
	Hopper Cars Ordered During 1935	
14	A. A. R. throughout	5,100
15	A. A. R. basic design, alloy steel, light weight	16
16	A. A. R. except outside stakes and height of side	475
17	Not A. A. R.	470
18	Miscellaneous and not investigated	3
	Total	6,064
	Box and Auto Box Ordered as of April 1, 1936	
19	A. A. R. throughout	300
20	A. A. R. throughout (inquiries released but orders not placed as of April 1)	1,300
21	A. A. R. except underframe with floating center sill	500
22	Not A. A. R. except center-sill section and 25¾-in. truck height	500
	Total	2,600
	Hopper Cars Ordered as of April 1, 1936	
23	A. A. R. except pressed U side posts instead of Z bar	2,000
24	Not A. A. R. except center-sill section, bolster center filler, 25¾-in. center-plate height and unit hoppers	1,000
25	Not A. A. R.	50
	Total	3,050
	Freight Refrigerator Cars	
26	Steel-sheathed following closely A. A. R. standards for underframe, center-sill section, 25¾-in. center-plate height and side construction. However, A. A. R. work has not progressed to any great extent, and other construction details are subject to change if the Joint Committee concludes desirable	2,700

of the new A. A. R., together with the period of transition and rapid change through which the railroad transportation industry now is passing. It appears, therefore, that we might better devote all available time and energy to current problems exclusive of the work on standard cars, rather than to pursue this activity further unless the member roads as a whole desire to support this standardization work and are prepared actually to do so by adopting and constructing the new designs when required.

Not long ago the A. R. C. I. debated this question and, upon instructions from its Board of Directors, advised us as follows:

> Having prepared, in collaboration with the Car Construction Committee, designs of the standard A. A. R. steel-sheathed wood-lined box, hoppers, steel-framed single-sheathed box and refrigerator car, it is the belief that the original assignment now has been carried out and that the Institute should be relieved of further obligations. Further, that during the period of the depression when working forces were greatly reduced, it was possible to carry on this work, though slowly, but with improvement in business conditions, and the various engineering staffs still depleted, it would be difficult so to continue.

Obviously this question now has reached the stage where it must receive renewed consideration and to this end your committee will submit in the near future to the General Committee a statement of all essential facts with request for further instructions. Meanwhile it is desirable to state that without continued co-operation of the A. R. C. I. the 1932 program no longer would be effective, since for the successful prosecution of this work, the combined skill, experience and knowledge of the following group are essential:

(1) The car builders as design and construction specialists.

(2) The railroads for the necessary knowledge of equipment operation, maintenance and utility.

(3) The specialty manufacturers for the development, production and proper installation of improved parts and appurtenances for use as desired by the purchaser.

Regardless of the decision which may be reached with respect to future standard car work, it is now advisedly stated that member roads who already have constructed freight cars to the new designs prepared under the 1932 program or have decided to adopt these designs for future needs, may be satisfied that no mistake is being made and that equipment representing the latest state of the art thus is obtained.

Standard Car Designs Being Completed

As described in detail elsewhere, we are now working, in co-operation with the A. R. C. I. and the Refrigerator Car Operators on completion of designs for a steel-framed single-sheathed box and a steel-sheathed refrigerator car, but this work could not be concluded for presentation this year.

Alternate Cast-Steel Constructions for Hopper Cars

Last year we presented in Appendix A specification and complete sets of principal drawings for 50- and 70-ton nominal capacity proposed standard hopper cars which were adopted as standard.

At the same time it was stated that drawings had been released to certain specialty manufacturers for the purpose of having prepared by them, alternate designs incorporating (a) integral cast-steel underframe and hopper constructions complete, and (b) certain parts such as bolsters, interior braces and hopper door frames in cast steel. Further, that as soon as drawings, together with comparative weight had been developed, a supplement containing this information would be made available to the Mechanical Division. This work now has been completed and is submitted in Appendix A to this report.

[Appendix A is made up of 20 plates—Plates 626 to 644, inclusive—which are briefly described. Comparative weights of the various alternate designs are also given. The drawings include complete car constructions from designs of the Unitcast Company and the General Steel Castings Corporation. In addition, there are drawings of alternate cast-steel cross-bearers, cross-ridge braces, body bolsters, side stakes and hopper frames designed by the Unitcast Company, also cast-steel center sills, underframes and hoppers designed by the General Steel Castings Corporation.—Editor.]

Standard Freight Refrigerator Car

During the past year the committee and the A. R. C. I. have been engaged in joint effort to develop a design for a ventilated refrigerator car based upon accepted fundamentals mentioned in our previous report. Preliminary designs have been prepared for study, also considerable research work has been conducted by roads represented on the committee.

Certain cars have been built and tested for insulative efficiency, air circulation and related features. Comparative tests with equal insulation are being made to determine the relative thermal efficiency of steel versus wood as an outside covering.

Recently one of the largest refrigerator-car operating companies placed an extensive order for steel-sheathed refrigerator cars of a design corresponding as closely as practicable to the general fundamentals as set forth last year, and this work should be definitely helpful in bringing this development to a successful conclusion.

The report on refrigerator cars was signed by the following subcommittee: A. H. Fetters (chairman), F. A. Isaacson, W. A. Newman, E. P. Moses and E. B. Dailey.

Steel-Framed Single-Sheathed Box Car

During the past year, through the joint effort of the A. R. C. I. and the Car Construction Committee, preliminary work on this design has been accomplished and although not completed, any road desiring to build a car of this type can secure sufficient data through the committee to show the fundamentals for the design now being developed. The subcommittee report on single-sheathed box car was signed by A. H. Fetters (chairman), F. A. Isaacson, W. A. Newman, E. P. Moses and E. B. Dailey.

Performance Test of Standard Box Car

In accordance with the plan outlined in 1935, the C. & O. has now completed a comprehensive road service test of A. A. R. standard steel-sheathed wood-lined box car No. 4 and a corresponding C. & O. box car of its own design.

A. A. R. car No. 4 had previously been submitted to complete deflection and severe impact tests. The C. & O. box car

weighed 3,600 lb. more than the A. A. R. car and had a cubic capacity 251 cu. ft. less, due to the fact that while the length and width of both cars was the same, the C. & O. car had an inside height of 8 ft. 7½ in., and the A. A. R. car a height of 9 ft. 4 in.

The two cars, loaded to axle limit (3,600 lb. more in A. A. R. car) with bulk sand and always coupled together to insure the same treatment, although being successively placed in various positions in the train, were placed in service during June, 1934, on the C. & O. for movement between Russell, Ky., and Walbridge, Ohio, a distance of 253 miles each way. The operation is northward one day and southward the next day, the cars being moved over the hump on arrival at each terminal. Accurate measurements of the cars were taken before and after completion of the tests.

The road service test did not develop any inherent defects in the construction of the A. A. R. car and it has proved its ability to perform satisfactorily under the several impacts to which it had been previously subjected, in addition to the severe usage in the nine months' road service test covering 35,407 loaded miles. Both cars have since been released into regular interchange service.

The report on the tests was signed by T. P. Irving.

Pullman-Standard Light-Weight Box Car

An experimental light-weight 50-ton box car* was built by the Pullman-Standard Car Manufacturing Company in 1935 as a contribution to the study of reducing the light-weight of box cars. The principal information desired was a determination of how much the weight could be reduced by a new design, rather extensive welding and an alloy steel without either sacrificing strength or materially affecting the price usually paid for a car of such capacity and type.

The car weighed 34,200 lb. empty, or 9,900 lb. less than a corresponding standard A. A. R. car. It was built of Cor-Ten steel and extensive welding was used, it being estimated that 22 per cent of the length of seams were arc welded, 54 per cent spot welded, and 24 per cent riveted. Truck side frames and bolsters, couplers and yokes were of light-weight design, high tensile steel. The center sill was of the same form as the A. A. R. car but of lighter section due to use of high-tensile steel. Side and end sheets were of Cor-Ten steel and lighter than the carbon steel sheets on the A. A. R. car. Couplers were of high-tensile steel but the draft gears were National M-17, the same as on the A. A. R. test car.

After being submitted to the same series of extensometer and deflectometer tests as were employed for the A. A. R. car, the Pullman car was turned over to L. W. Wallace, director of equipment research, for extensive impact tests, these also being the same as used for the standard car. In the impact tests the Pullman car was used as the struck car and a standard A. A. R. car, loaned by the N. Y. C., as the striking car.

During the tests over 10,000 measurements were taken. The data are being tabulated and a full report will soon be submitted to the Car Construction Committee.

This portion of the report was signed by L. W. Wallace.

Equipment Clearances and Maximum Outline

Last year we stated that the Engineering Division had been requested to revise and set up as the "Maximum Outline for Equipment in Restricted Service" the diagram adopted by the A. R. E. A. in March, 1934 and also to develop a limiting diagram for unrestricted interchange, somewhat larger than present Plate B.

Under date of March 14, 1936, we received from the Special Committee on Clearances, A. R. E. A., clearance diagrams marked Figs. 13 and 14, the former being the same as Plate B and the latter marked "Unrestricted for Main Lines."

These were reviewed and the Special Committee on Clearances was requested to consider the following changes and revise Fig. 14 accordingly if found practicable:

Increase over-all width dimension from 10 ft. 7 in. to 10 ft. 8 in., the reason being that many box and auto cars are now built to 9 ft. 2 in. clear inside width, and after making necessary allowance for minimum clearances required for door fixtures and other attachments, the over-all width of such cars is only fractionally under 10 ft. 8 in.

Indicate on the figure information outlined below:

(a) Length of car which can be built thereto; (b) whether this figure represents the outline to which new cars are to be constructed or if intended as the outline to which existing cars are to be maintained. If the former, then with multiple-wear rolled-steel wheels dimension of 4 in. above the rail should be made 5 in., and if the latter, this dimension should be made 2½ in.

Reply has not been received, therefore, progress statement only is being made. When the two figures are completed, it is the intention to have diagrams prepared, including suitable explanatory notes and submitted to letter ballot.

* For description see *Railway Age*, June 22, 1935.

Side Frames and Truck Bolsters

In view of the fact that existing specifications make no provision for the use of alloy steel in side frames and bolsters, tentative requirements were prepared and approved by the Car Construction and Specification committees. These tentative requirements (included as Exhibit A of the report but omitted in this abstract) are used as a guide by the joint subcommittee in granting or withholding approval of all alloy-steel side frames and bolsters of new designs or new materials.

It is not intended to propose adoption of these as standard requirements to be shown in the Manual, for the reason that dynamic tests are too costly as well as unnecessary for acceptance of frames by individual roads. As soon as a sufficient background of test and service experience with these new designs and materials has been accumulated, standard specifications, based upon static tests, will be prepared and submitted for adoption, as was done for frames and bolsters of carbon steel.

During the past year the manufacturers have continued their research and development work and many dynamic and static tests have been made under the supervision of your subcommittee. As a result two designs of side frames and three designs of bolsters have been approved.*

In addition, applications for approval have been received covering seven designs of side frames and six designs of bolsters.†

Approval of five designs of side frames has been withheld, either because of failure to pass satisfactory tests or because, for other reasons, the designs were considered unsatisfactory for the service intended.

Permission, limited to two car sets only, was given to apply under passenger equipment refrigerators a design of truck having bolster with lateral motion feature, but the truck is not approved for passenger service operation because the bolster arrangement is not regarded as adequate for this service.

Inquiries received from several roads with respect to spring-plankless trucks indicate misunderstanding as to the extent to which use of trucks of this type has been approved. By reference to the report for last year, it will be noted that the Four-Wheel Truck Association design of spring-plankless truck in both Grade B and alloy steel has passed satisfactory static and dynamic tests. Therefore, these designs and any others which have passed satisfactory tests are acceptable for use in interchange freight service. Additional information with respect to trucks of this general type, including certain designs not yet approved, is shown in Tables 2 and 3 of this report.

The subcommittee report was signed by H. W. Faus (chairman), T. P. Irving and T. D. Sedwick.

Non-Harmonic Truck Springs

Following completion of the laboratory and road tests conducted during 1933 on devices variously designated as friction springs, snubbers and stabilizers, the devices were placed in service, two car sets of each, under General American Transportation Company refrigerator cars to obtain comparative information as to endurance qualities.

The endurance test is now nearing completion. In order not to prolong these tests unduly, it was decided to remove all springs and special trucks as soon as practicable after the cars to which they were applied had accumulated 50,000 service miles. By December 31, 1935, 15 of the 25 car sets had been removed for the above reason or because of failure. On that date each manufacturer of devices included in the test was furnished with a summary of the results of the tests of his own device up to that time. On April 20 seven car sets remained in the test but the probability is that all will be removed and tests closed by June 1.

As soon as possible after the remaining springs and devices have been examined and calibrated, a final report will be prepared.

The subcommittee report was signed by F. A. Isaacson (chairman), T. P. Irving and H. W. Faus.

Helical Truck Springs

In the 1932 report, designs of helical springs for 40-, 50-, and 70-ton nominal capacity trucks were included and were later

* Table marked No. 2 accompanying the report gave information covering Gould and American Steel Foundries side frames, also bolsters submitted by the Pressed Steel Car Company, Gould, and Buckeye, all of alloy steels. The table also showed applications made.

† Table marked No. 3 accompanying the report included information relative to side frames submitted by the Pressed Steel Car Company, National Malleable & Steel Castings Company, American Steel Foundries, and Standard Car Truck Company; also bolsters submitted by National Malleable & Steel Castings Company, Buckeye, and Standard Car Truck Company. This table also listed applications made.

submitted to letter ballot and adopted as recommended practice. These designs were prepared to meet maximum loading and service conditions, to eliminate the continual expense of replacing broken springs, and were to be made of plain carbon steel to the then existing A. A. R. material specifications, being designed to interchange in the space occupied by the then A. A. R. standard spring groups and were based on no inactive coils and a modulus of torsion of 12,600,000 lb. per sq. in.

In 1933 revised specification M-114-34 for heat-treated carbon-steel springs was prepared, submitted to letter ballot and adopted as recommended practice. These specifications include a provision requiring the use of modulus of torsion of 10,500,000 lb. per sq. in. and 1½ inactive coils.

The principal reasons, at this time, for preparing new designs, to replace the springs adopted in 1932, are as follows:

1—To utilize a better grade of material than now obtainable under revised specification M-114-34.
2—To provide more capacity than the 1915 design but somewhat less than the 1932 springs.
3—Based on information obtained from tests made since 1932, the new designs will result in lower impact forces being delivered into trucks and bodies as well as to the lading in the cars.
4—The new springs adapt themselves more readily in groups, such as Dalman and Double Truss, and also are designed to function more satisfactorily in conjunction with non-harmonic spring devices.
5—The new springs, having greater capacity and more reserve travel while having practically the same total deflection as the 1915 springs, are designed to meet maximum load conditions and at the same time resist breakage in present-day service.

The proposed springs are somewhat more expensive than the 1915 or 1932 in plain carbon steel because of the higher costs of both materials and fabrication. However, for reasons enumerated above, it is evident from the experience and test information available that a change from the 1932 design is advisable and it is believed that the better performance characteristics will fully justify this change from an economic standpoint.

The subcommittee has prepared and now submits designs for the 40-, 50-, 70-, and 100-ton nominal capacity trucks, to be designated as Classes C-2, D-2, H-2, and P-2, to replace the C, D, and H springs now in the Manual and to provide a new design for the P-2 spring. All new springs interchange in the spaces now provided on present A. A. R. groups.

The non-patented spring plates shown on the drawings are designed to eliminate spring bolts used with former designs. These plates are 3/16 in. thick and the overall free height of spring and plates is increased 1/8 in. over the 1932 design. Other spring plates may be used provided they are of equivalent strength and interchangeable with the spring plates shown.

[A comparative statement of design and capacity characteristics of the 1915, 1932, and proposed design was appended as information, also drawings of the proposed springs.—Editor.]

The following recommendations are made:

1—That new designs C-2, D-2, and H-2, be submitted to letter ballot for adoption as recommended practice for use in place of springs, C, D, and H, now in the Manual.

2—That new design P-2 be submitted to letter ballot for adoption as recommended practice.

The subcommittee report was signed by T. P. Irving (chairman), H. W. Faus and F. A. Isaacson.

Truck Spring Planks

A progress report including preliminary recommendations was included in the report last year.

Further study has shown that spring planks of various designs are causing trouble and that spring planks applied to cars as recently as 1934 are cracking and breaking. Among apparent causes of failure may be cited the following:

1—Insufficient flexibility.
2—Method of attachment to side frames.
3—General design.
4—Method of fabrication.
5—Material.
6—Irregularities in application.

Spring planks in use today are of so many designs and types, and so few facts were available as to the actual service performance of most of these, that your subcommittee came to the conclusion that more information would have to be obtained. Therefore, a questionnaire designed to obtain detailed records of spring-plank failures for 1934 and 1935 was sent to a representative list of railroads and car owners. When replies have been received, the subcommittee proposes to analyze the data and hopes to be able to submit definite recommendations next year.

The Engineers' Committee of the Four-Wheel Truck Association has co-operated in this investigation. The subcommitee report was signed by F. A. Isaacson (chairman), T. P. Irving, W. A. Newman and H. W. Faus.

Rail Motor Car Axles

This subject has been under investigation since 1929 and in its work your committee has collaborated with American Transit Association. (Formerly American Electric Engineering Association.)

As requested by the A. A. R. committee on Specifications for Materials, the A. T. A. specifications have been checked and your committee now recommends that these specifications be adopted as recommended practice. (Accompanying the report was a proposed specification for traction motor axles suitable for gas-electric and similar heavy motor cars.—Editor)

Passenger Equipment Axles

During the past year your committee has been instructed to investigate certain failures of axles in passenger service, particularly drive axles for air-conditioning equipment. A joint subcommittee has been appointed consisting of representatives from Wheels, Material Specifications and Car Construction committees.

Information has been obtained from a number of roads on failures of this nature. Studies thus far made indicate that the bending effects from generator pulley action cause only small increases in the axle stresses, whereas the added load of air-conditioning equipment has, in some cases, increased the unit stresses to a point rather close to safe capacity. It is also evident that improper mounting of the generator pulley and poor workmanship may contribute to such failures.

Since receiving original instructions, this assignment has been broadened to include all axles for passenger equipment cars, together with the effects of operating changes, such as increased weights and speeds. This is a broad and intricate subject which will require much further study and research before definite conclusions can be reached. Therefore, a progress report only is submitted.

The subcommittee report was signed by B. S. Brown (chairman), K. F. Nystrom and T. P. Irving.

Container Car Design

Last March your committee was instructed to produce a design of container car in accordance with a brief specification from the Federal Co-ordinator of Transportation, work to be completed with a specification by May 15.

Work was undertaken with the understanding that the car desired is of new and experimental character and in view of absence of experience, work was confined to features of safety and suitability for operation in interchange.

Tentative specifications called for containers of 2,500 lb. tare weight and a load capacity 24,000 lb., containers to consist of fully enclosed boxes mounted on two skid rails spaced not less than 48 in. or more than 54 in. center to center and with clear height not less than 4 in. from bottom of skid to container base.

The car was to be designed to carry five containers and have a light weight of 36,500 lb. Plans were made for a car of Cor-Ten steel construction but due to limited time to work out the design the calculated weight was 44,700 lb. By further study it probably would be possible to reduce the weight to 36,500 lb.

Work was finished and drawings submitted to the Co-ordinator's organization on May 15. A copy of the general drawing with descriptive specification may be obtained by request from the secretary.

The special committee report was signed by P. W. Kiefer (chairman), T. P. Irving, B. S. Brown, H. E. Myers, and H. L. Holland.

Door Fixtures

In last year's report it was stated that a subcommittee had been appointed to check over the door fixture standards now shown in the Manual, for the purpose of eliminating older and obsolete details. This work has not been completed and therefore, progress only may be reported this year.

The subcommittee report was signed by F. A. Isaacson.

Lettering and Marking for Automobile Rack Cars

[Accompanying the report were eight drawings of markings which were recommended to be shown on a new sheet for the Manual to serve as a system of identification of the several styles of automobile loading equipment now in service, made necessary by the development of new automobile designs—Editor.]

Load Limits and Wheel Designs

Interchange Rule 86—The question of stencilled load-limit capacities on freight cars, particularly hoppers, taking into account the various weights of wheels having been raised, a subcommittee was appointed to study the question.

This question was prompted by a feeling that present load-limit ratings discriminated against the use of the heavier wheels; further, that since a rail load-limit capacity has been based on axle capacity, the rail load-limit capacity could be raised somewhat when cast-iron wheels are used.

After an analysis of axle stresses and moments, your sub-

committee submits a proposed revision for Interchange Rule 86.

[The report includes stress analyses and a revised axle drawing with new and limit-of-wear dimensions. Two groups of wheels are shown—"heavy" and "light." For "heavy" wheels load limits have been increased for several axles.—EDITOR.]

The following wheels are considered as "heavy":

Cast iron.
Multiple-wear wrought steel, outside rim from new to 1⅝ in. thick.
Two-wear wrought steel, outside rim from new to 1⅝ in. thick.
Heavy-service cast steel, outside rim from new to 1⅝ in. thick.
Three pairs of any of the above wheel and one pair of others.

The wheels listed as "light" are:

One-wear wrought steel.
One-wear cast steel.
Multiple-wear, also two-wear wrought steel and heavy-service cast-steel wheels having outside rim below 1⅝ in. to scrap limit of the wheel.

The proposed revision of Rule 86 requires the following increases in axle capacities and total rail loads for four-wheel trucks having "heavy" wheels—no changes are proposed where "light" wheels are used:

Axle size	Axle capacity, lb.		Total rail load, lb.	
	Light wheels	Heavy wheels	Light wheels	Heavy wheels
5 in. by 9 in.	32,000	32,250	136,000	137,000
5½ in. by 10 in.	40,000	40,500	169,000	171,000
6 in. by 11 in.	50,000	50,500	210,000	212,000

The subcommittee report was signed by B. S. Brown (chairman), K. F. Nystrom and T. P. Irving.

Definitions and Designating Letters for Freight Cars

Requests have been made for new recommended practice designating symbols and definition to cover a beverage refrigerator car, without ice bunkers and equipped with two or more fixed tanks for transporting beverages or other liquids in bulk.

The following new definition and symbols are recommended:

"RBT"—Beverage Container Refrigerator. Similar in design to "RS" type, but with no ice bunkers. Provided with two or more fixed tanks for transporting beverages or other liquids in bulk. With or without means of ventilation.

The subcommittee report was signed by C. E. Adams.

New Designs of Light-Weight Freight Cars

Interchange Rule 3—The work of the committee was greatly increased during the past year after the circular on new designs of light-weight freight cars was sent to car owners and builders on May 22, 1935. This circular called attention to the fact that Rule 3 required that design cars of untried type must be approved by the Mechanical Division before they can be accepted for interchange.

During the past year 19 railroads or other companies have submitted to the committee for their approval 21 designs for new types of freight cars or details thereof. These have practically all been of lightweight alloy-steel construction. Included among them have been designs for box, hopper, gondola, refrigerator, tank, container, and flat cars. Special light-weight trucks and hollow-bored axles have also been submitted. Most of the designs have been approved, either as submitted, or after certain changes and modifications had been made. Quenched and tempered hollow-bored axles, where employed in these cars were not approved, and release on light-weight alloy-steel truck side-frames was withheld pending tests under dynamic loading.

Letter Ballot Items

It is recommended that the following items contained in this report be submitted to letter ballot of the members:

1. Designs for helical truck springs for freight car trucks. Recommended practice.
2. Designs for electric traction motor axles suitable for gas-electric and similar types of heavy rail motor cars. Recommended practice.
3. Lettering and marking for automobile rack cars. Standard practice.
4. Revision of Interchange Rule 86 for adjustment of rail load-limit capacities to compensate for the various weight wheels now in general use. Standard practice.
5. Definitions and designating letters for freight cars. Recommended practice.

The report of the Committee on Car Construction was signed by P. W. Kiefer (chairman), chief engineer motive power and rolling stock, N. Y. C.; T. P. Irving (vice-chairman), engineer car construction, C. & O.; W. A. Newman, chief mechanical engineer, Can. Pac.; A. H. Fetters, general mechanical engineer, U. P.; J. McMullen, superintendent car department, Erie; F. A. Isaacson, engineer car construction, A. T. & S. F.; G. S. Goodwin, assistant general superintendent motive power, C., R. I. & P.; F. B. Dailey, engineer car construction, S. P.; B. S. Brown, general foreman, Penna.; K. F. Nystrom, superintendent car department, C., M., St. P. & P.; H. E. Myers, master car builder, L. V., and H. L. Holland, assistant engineer, B. & O.

Discussion

The committee's very evident discouragement at the small practical results, in the form of cars actually built to the standard designs on which both it and the Design Committee of the American Railway Car Institute have devoted so much effort, drew out a lively discussion. It was the wish of those who spoke that the standardization work of the committee be continued so that new developments can be taken into consideration just as fast as practicable, and the standards kept up to date, according to the plan on which the committee is working. Several speakers stressed the quality of the designs resulting from the joint effort of the best talent of both the railroads' and car builders' designers—which no railroad working alone can hope to equal. It was suggested by C. T. Ripley (Atchison, Topeka & Santa Fe) that perhaps the Mechanical Division should bring the matter before the railway executives. In agreeing with this, F. H. Hardin (New York Central) moved that the subject be brought before J. M. Symes, vice-president in charge of the Operations and Maintenance department of the Association of American Railroads, with the request that he lay it before the Executive committee and the board of directors. The motion was carried. The report was approved and the proposed revision of rule 86 ordered referred to the Arbitration committee before being submitted to letter ballot. The committee was accorded a standing vote of thanks.

Report on Air Conditioning and Equipment Lighting

A comprehensive and detailed series of tables covering air-conditioned cars now in service constitutes a major part of the report. The data are classified in four ways: (1) tyues of cars, (2) types and kinds of air-conditioning systems, (3) types of motor drive, and (4) capacities of generators with respective types of drive.

In addition to this, the committee gave particular attention to the question of voltage of power supply to railway passenger cars. Concerning this subject, the committee offers the following for information and guidance for future study:

"In the past several years there has been a gradual increase in general demand for electric power as supplied by the 32-volt axle-driven generator and battery equipment on passenger cars. Generally speaking, to take care of this situation axle generator equipments have been duplicated or have been increased by 2 to 5 kw. each, and batteries have been increased by 200 amp.-hr. to 600 amp.-hr. capacity.

"With the introduction of electrically operated air-conditioning equipment on railway passenger cars using the 32-volt system, it has been necessary to either increase the 32-volt axle generator from 5 kw. to 10, 15 or 20 kw., and increase the battery capacities to 1,000 or more amp.-hr., or install an additional 32-volt axle generator and battery of sufficient capacity to take care of that load independently of the lighting and other auxiliary load.

"There has been no particular difficulty with the satisfactory operation of the so-called 32-volt axle generator equipment and battery, but if the extended use and increase in 32-volt generator capacity is to be practically met, some other system of higher-voltage generation and power distribution must of necessity be considered.

"The committee feels that the general public is becoming more and more accustomed to a high intensity of illumination in their homes and places of business, and for this reason expects the railroads to provide illumination of comparable intensity in their passenger cars. Also, the trend to artistic effects in illumination naturally calls for a greater amount of power to obtain the effects desired. Therefore, as noted above, there seems to be a well founded reason why the demand for power will steadily increase. Serious consideration should be given to the study of a suitable system of electric power generation and distribution that will take care of this phase of passenger equipment in railway service for some considerable time. Obviously, a power generating and distributing system designed to supplant the present 32-volt system will be far-reaching and expensive. The subject should be approached slowly and deliberately, and the situation studied and watched very closely, at least for the next year or two.

"As a matter of preliminary information, there are several power and voltage systems which can be used to replace the 32-volt axle generating system, i.e.:

"1—The 64-volt generator system will increase the capacity and double the number of cells. Because of the higher voltage,

the transmission of power with smaller size wires will be possible, but this system would probably only take care of the situation for a short time under the present rate of increase in the electrical load.

"2—The 110-volt axle generator system will increase the capacity but requires three and one-half times as many cells of battery as the 32-volt system, and one and three quarters times the number of cells required by the 64-volt system.

"The 110-volt system requires 55 cells of battery and, therefore, the question of weight and battery space under the passenger car seems to be a serious handicap. Again, if air conditioning by electricity is to be extended, this system would not seem adequate.

"3—The third system, which would appear at the present time to give promise of a more permanent nature, would be the centralized independently driven 440-220-volt, three-phase, 60-cycle generating power plant located at the head end of the train, the current transmission being carried to each car by means of a three-phase, 220-volt, 60-cycle train line. With this 220-volt a.c. system the present 32-volt batteries and lights could remain as at present. Some changes would possibly have to be made, substituting universal type motors for the present 32-volt fans and other auxiliary equipment, which could be operated on either 32-volt d.c. or 32-volt a.c. A small transformer could be placed in each car to reduce the 220-volt a.c. to 32-volt, and a motor-generator set, converter, or rectifier unit installed for battery charging from the 220-volt, three-phase line.

"The 220-volt, three-phase, 60 cycle power generating and distribution system will also fit in with the present trend of power generation and distribution on streamline trains and Pullman stand-by services. In fact, cars now equipped with the 220-volt, three-phase stand-by motors, could be operated direct from the central plant, eliminating the mechanical drive.

"Two hundred-twenty-volt, three-phase, 60-cycle power is the universal commercial power used and no difficulty would be experienced in obtaining stand-by power at practically all yards, terminals and lay-over points. A centralized power plant and 220-volt system would take care of power requirements indefinitely."

Plugs and receptacles for making connections to air-conditioned cars from outside power sources are not fully interchangeable. To correct this condition, the committee has included drawings of plugs and receptacles, and it recommends the adoption of these as recommended practice.

The report is signed by W. E. Dunham (chairman), superintendent car department, C. & N.W.; E. Wanamaker, electrical engineer, C.R.I. & P.; A. E. Voigt, car lighting engineer, A.T. & S.F.; F. O. Marshall, electrical engineer, Pullman Company; P. J. Callahan, supervisor car and locomotive electric lighting, B. & M.; O. M. Bixby, assistant engineer, N.Y.C.; I. V. Goodman, assistant electrical engineer, Pennsylvania; and G. W. Bebout, electrical and shop engineer, C. & O.

Action.—The report was accepted and the recommendation regarding a plug and receptacle for stand-by power connections was ordered submitted to letter ballot.

Report on Tank Cars

During the year the committee considered a total of 328 dockets and applications for approval of designs, of which 186 covered shipping containers for application to new cars or for replacement on existing cars. Nine applications covered 28 multi-unit cars to be used for the transportation of 15 Class I. C. C.-106-A-500 one-ton containers each. One application covered a new underframe and trucks for use in mounting an existing tank-car tank. A total of 112 applications covered alterations in existing equipment. Twenty applications were received for approval of tank car appurtenances.

Fusion Welded Tanks

Following a hearing before the Interstate Commerce Commission, held September 5 to 7, 1934, the commission, under date of November 13, 1935, denied the petition of the association for approval of fabrication by the fusion-welding process of tank-car tanks to be used in the transportation of all dangerous commodities, except chlorine. The commission likewise denied petitions of E. I. du Pont de Nemours and Company and the Union Tank Car Company for approval for experimental service of tank-car tanks fabricated by the fusion-welding process. The commission did, however, approve the petition of Grasselli Chemical Company for approval for experimental service of 10 fusion-welded, rubber-lined tanks for the transportation of muriatic acid for the reasons that muriatic acid will subject these tanks to low internal pressure; difficulties due to moisture remaining in tanks after hydrostatic test pressures, and the difficulties experienced in applying rubber lining over rivet heads and the edges of lap seams in tanks constructed with riveted and calked seams will not be present in the smooth interior of tanks fabricated by means of the fusion-welding process.

By petition, dated December 19, 1935, the Union Tank Car Company asked for a reconsideration of its petition and requested the right to use in experimental service in the transportation of liquefied petroleum gas 25 cars to be equipped with tanks fabricated by means of electric fusion-welding, but otherwise conforming to Shipping Container Specification I. C. C. 105-A-400.

The commission, under date of April 15, 1936, upon further consideration of the record and in the light of the added facts disclosed in the petition of the Union Tank Car Company for reconsideration, authorized further service tests of petroleum products in the 10 cars already built and authorized the construction of 15 additional cars to be constructed in all respects similar to the 10 cars already constructed.

The commission, in its order of April 15, 1936, also authorized the construction for experimental service of one tank-car tank of nitric-acid-resistant metal by the fusion-welding process for the E. I. du Pont de Nemours & Company and 25 tank-car tanks for experimental service in the transportation of petroleum products for the Phillips Petroleum Company; the tanks to be constructed in accordance with I. C. C. Specification 105-A-300 except that fusion-welding may be substituted for the method of construction covered by that specification.

In granting the authority to construct and operate the foregoing fusion-welded tank-car tanks in experimental service, the commission requires certain inspections and reports to be made by the owners or operators of these cars.

The Chlorine Institute, Inc., has submitted an improved safety valve for use on cars transporting chlorine. This valve has been developed in accordance with results of tests conducted in cooperation with your committee. The committee has authorized The Chlorine Institute, Inc., to manufacture and place in service 50 valves of this improved design.

Classification of Tank Cars

The matter of re-classification where a new tank is applied to an existing underframe has arisen during the year due to the large number of tanks of I. C. C. classification which have been built for application to existing underframes and trucks. For transportation and service requirements, tank cars shall always bear the classification of the tank or tanks mounted thereon. In other words, if a new Class I. C. C. 103 tank-car tank is mounted on an existing underframe which previously carried an A. R. A. III tank, the car shall be re-classified as I. C. C. 103.

In connection with this application of a new tank to existing underframe, the requirements of Par. (15), Section (t), Interchange Rule 3, should be met. This rule provides that, in the application of new tanks to secondhand underframe and trucks, the underframe must at least conform to the A. R. A. Specification for Class III tank cars, effective May 1, 1917 to July 1, 1927, and the trucks must be equipped with cast steel sideframes meeting A. A. R. specifications.

The committee has received applications during the year for the approval of welded splash angles on the outside of acid tanks. The committee is definitely opposed to autogenous welding on tank-car tanks when it is not possible to properly anneal the tank as a whole after such welding has been performed. The committee will, therefore, not approve any further requests for the use of welded splash angles on riveted tank-car tanks.

As result of continued unfavorable conditions, your committee has recommended to the Arbitration Committee the extension to January 1, 1938, of the following requirements of Interchange Rule 3: Section (t), Par. (8)—Head-block anchorage on tank cars; Section (t), Par. (9)—Wood shims between longitudinal anchorage and underframe, on tank cars; Section (t), Par. (14)—Dome covers secured by hinge or chain, on tank cars; Section (t), Par. (16)—Class I tank cars prohibited in interchange.

Protection of Air Vents, Venting and Loading Pipes

The committee has received a number of applications for the alteration of cars, both of A. R. A. Class III and I. C. C. Class 103 designs, involving the application of air vents, venting and loading pipes, etc., on the dome without being properly protected by being set into a securely covered recess or by means of a cast, pressed-steel, or malleable-iron housing with a cover that can be securely closed.

It is the opinion of the committee that, when changes are made in cars of former A. R. A. classification, they should be made to conform as far as practicable to the specifications in effect for cars of corresponding I. C. C. classification even though the commodities to be transported are of a non-regulatory character.

In accordance with this opinion, on future applications for cars equipped with air vents, venting and loading pipes, etc., on the dome, proper housing or protection cover will be required in

accordance with paragraph I. C. C.-11 of Specification 103.

It is the unanimous opinion of the committee that the welding of placard holders by either tack welding or edge welding to the shells of tank-car tanks should be prohibited in the future but that this action should not be retroactive as to any cars now in service covered by previous approval of this practice. Accordingly, the committee will no longer approve this method of applying placard holders to tank cars.

It is the further opinion and recommendation of the committee that, when placard holders which have been previously welded to tank-car shells become loose, they should not be reapplied in this manner but that the regular placard board should be applied as covered by the standard tank-car specifications.

Suggested Changes in Specifications

The committee has recommended to the Bureau of Service, Interstate Commerce Commission, and to the Bureau of Explosives that a sentence be added to paragraph 6 (a) of Specification I. C. C.-103, making this paragraph to read as follows: "I. C. C.-6. Riveting.—(a) For computing rivet areas the effective diameter of a driven rivet is the diameter of its reamed hole, which hole must in no case exceed nominal diameter of rivet by more than 1/16 in. All rivets must be driven hot. *The use of two 'liners' not to exceed 1 in. in width and 1/16 in. in thickness, placed at an angle across the longitudinal seams between two rows of rivets near the internal tank heads on compartment cars to prevent the liquid from passing along the longitudinal seams from one compartment to another while cars are being water tested, will be permissible.*"

Upon recommendation from the Committee on Tank Cars in its report for 1933, the Association adopted as recommended practice, by letter ballot, designs of dome covers for tank cars of Classes I. C. C. 104-A and I. C. C. 105-A as covered by Figs. 7 and 8 now incorporated in Supplement No. 2 to the current tank-car specifications, issued in April, 1936.

[The committee here included eight recommendations regarding detailed changes in Fig. 8, to be submitted to letter ballot. —Editor]

As a result of continued reports of failure of hollow cast-iron plugs in the heads of tank cars, it is recommended that the following new paragraph, to be designated "A. R. A.-16," be included in I. C. C. Specification 103: *"A. R. A.-16. Solid plugs when inserted from the outside must be so indicated by having a raised 'S' cast integral on the face or top of the square head or be otherwise marked 'S' by steel stamp, prick punch or legible stencil, indicating the plug is solid. Plugs inserted from the inside are identified by appearance of the plug on the outside of the tank whether hollow or solid—therefore, no mark or stencil required."*

It is recommended that the foregoing addition to these specifications be submitted to letter ballot of the members for adoption.

Interior Heater Pipes

During the past year applications have been received from builders and owners of tank cars requesting approval of electric-resistance welded pipe for interior steam lines in tank cars. As a result of the study which has been given this subject by the committee, it is recommended that Par. 1 under Sec. G—Specifications for Tank Car Heater Pipes, page 7 of the Tank Car Specifications, be changed in accordance with the proposed form shown below: *Proposed Form:* 1. Heater Pipes and Fittings.—When threaded joints are used, pipes shall be not less than two-inch "extra *strong*" lap welded *steel or wrought iron to current A. A. R. specifications;* or *electric-resistance-welded steel of same diameter and thickness to current A. S. T. M. specifications. When the joints are welded, instead of threaded, to give them substantially the same bending strength as the body of the pipes, the thickness may be reduced 20 per cent.* Joints shall be made by threaded wrought couplings, forged unions, or welding. A minimum number of connections shall be used.

The committee recommends the submission to letter ballot for adoption as recommended practice the specifications for fusion-welded aluminum tank-car tanks for the transportation of non-dangerous commodities as shown in the attached Exhibit A. These specifications have been prepared in co-operation with representatives of the car builders and the Aluminum Company of America.

The report was signed by Chairman G. S. Goodwin, assistant to general superintendent motive power, Chicago, Rock Island & Pacific; Vice Chairman F. A. Isaacson, engineer car construction, Atchison, Topeka & Santa Fe; A. G. Trumbull, chief mechanical engineer, Chesapeake & Ohio; G. McCormick, general superintendent motive power, Southern Pacific; W. C. Lindner, chief car inspector, Pennsylvania; A. E. Smith, vice-president, Union Tank Car Company; G. E. Tiley, assistant traffic manager, General Chemical Company; C. C. Meadows, master car builder, Tidewater Oil Company; G. A. Young, head, School of Mechanical Engineering, Purdue University; F. Zeleny, engineer of tests, Chicago, Burlington & Quincy; W. C. Steffa, transportation manager, Sinclair Refining Company; R. T. Baldwin, secretary, The Chlorine Institute, Inc.

Action.—The report was accepted and the recommendations referred to letter ballot. The committee was accorded a vote of thanks for its very complete report.

Report on Lubrication of Cars and Locomotives

Methods of Lubrication

Tests of various types of lubricators and methods of lubrication have been continued by a number of member roads. Reports received by the Committee so far have not developed anything of sufficient merit to warrant any recommendations at this time. Tests are still in progress and observations will be continued to ascertain definite operating performances.

During the extreme weather of the past winter there was a decided increase in delays to passenger trains on some roads due to hot boxes. Much of this trouble was due to moisture in the journal boxes, causing packing to freeze and roll out of position with resultant break down of lubrication. The past winter has emphasized the importance of and necessity for leak-proof dust guards and journal-box lids.

The present specification for dust guards does not provide a leak-proof guard, and your committee has now undertaken a study to determine the possibility of securing adequate dust-guard and box-lid protection for journal boxes. As various methods of sealing journal boxes are being experimented with by member roads, the committee would appreciate suggestions from members and manufacturers, of any new developments or devices of merit that are now being used or tested.

Journal Bearings

The new design of journal bearing known as the S.B.O.C. (Security Bond Oil Control), developed by National Bearing Metals Corporation, has been tried by a number of railroads and private car lines. Some member roads have requested permission to use this type of bearing in interchange as an equivalent substitute for the standard A. A. R. bearing.

This committee, after investigating the performance of these bearings, feels that they can be accepted as equivalent to the A. A. R. bearings in interchange and recommends accordingly.

Specifications for Reclaimed Car Oil

As a result of recommendation made in the 1935 report, the Committee on Specifications for Materials has reworded Specification M-904-36 and added two paragraphs describing apparatus and procedure for testing for extraneous solids.

This revised specification is submitted for adoption.

Interchange Rule No. 66

Examination of the condition of journal-box packing, bearings and wedges of freight cars, where the work had been performed as required by Rule 66, notably on equipment built during the past two years, indicated that the periodic repacking period could be extended without impairing the service. The Committee therefore recommends that consideration be given to an extension of three months beyond the present requirement of 12 months and 15 months. The extended period will then more closely coincide with air-brake cleaning dates, one repacking period equaling present air-brake cleaning period, and two repacking periods equaling one cleaning period for cars equipped with AB brakes.

There are still member roads and private car lines that use materials not meeting the A. A. R. requirements when repacking owned cars. It is felt that no further improvement in the hot box situation can be expected unless there is a unity of purpose upon the part of all car owners to insist upon full compliance with the requirements of the rules.

This Committee is strongly in favor of adding to Interchange Rule 3 a requirement that all cars in interchange must have journal boxes packed and stenciled in accordance with requirements of present Rule 66 and materials used must meet the requirements of the A. A. R. Standards; and respectfully recommend that the Arbitration Committee give this their consideration.

The question of application of new journal bearings in connection with change of wheels and axles has been considered by the committee and it is recommended that if, in the judgment of repairing line, the old journal bearings may be safely re-used on the journals of axles applied, charge for new journal bearings

on such axles is not justified. It is recommended that the Arbitration Committee give this matter consideration.

Renovated Journal-Box Packing

The committee has undertaken a review of present A. A. R. requirements for renovated journal-box packing as now contained in Rule 66, with a view to proposing changes to clarify and tighten up on the requirements, establish methods of sampling, testing and analyzing; and also to consider the advisability of proposing specifications for renovated packing.

The committee has no report on locomotive lubrication at this time.

The report was signed by G. W. Ditmore (chairman), master car builder, D. & H.; P. Maddox, superintendent car department, C. & O.; E. Von Bergen, general air-brake, lubrication and car-heating engineer, I. C.; H. P. Allstrand, assistant superintendent motive power, C. & N. W.; E. L. Johnson, assistant engineer of tests, N. Y. C., and J. R. Jackson, engineer of tests, Mo. P.

Action.—The report was accepted.

Report on Loading Rules

As the result of meetings held with shippers and investigations conducted during the past year, the committee recommended changes in the loading rules as shown below. In connection with the general rules, the suggestion was made to eliminate the words in parenthesis, (1 to 19) in the heading on page 12 since this is taken care of in the second sentence of Rule 1.

RULE 1

Change second sentence of Rule 1 to read:

"Special instructions must be procured from the originating carrier for shipments on open top cars not covered in these rules, and exacting care must be exercised to see that the details in Rules 1 to *21,* inclusive, are complied with in connection with all loading, except as otherwise specified in this code of rules."

Reason: To include Rule 20 as contained in Supplement No. 2 and to provide for new Rule 21.

RULE 3

Change to read as follows: "*Clearance—Side Bearing*—Trucks must curve freely and the average clearance between side bearings must not be more than ¼ in., or less than ⅛ in. per side bearing per truck."

Reason: To harmonize with the present wording in the Manual on Page 3, Sec. C, of the 1935 revision.

RULE 6

Change to read as follows:

"*Weight of Load (Rule 4), on Bearing Pieces With or Without Sliding Pieces.*

(a) Weight carried on one bearing piece per car should not exceed the percentage of stenciled load weight limit, as shown in columns 7 and 8 of Tables No. 18 to 50, inclusive, depending on the class of car as shown in the table.

(b) Weight carried on top of gondola car sides between body bolsters must not exceed one-half of the load limit of car. Height of loads on top of gondola car sides, measured from top of rail to center of load must not exceed 9 ft. 3 in. at bearing pieces. Short material underneath load on top of gondola cars must be equally distributed over car floor, but the entire load on wooden underframe cars must not exceed three-fourths of the load limit of car.

(c) Lading on top of gondola cars with wooden sides less than 3 in. thick, or steel gondola cars with sides not sufficiently strong to carry load is prohibited. Corner stakes of cars with drop ends must be suitably reinforced for loads on top of sides, except when especially prepared for the particular lading."

Reason: To conform with two new columns in Tables 18 to 50.

RULE 8

Change Sec. (d) to read:

"Provide 4 in. clearance between underside of load and car, for loads on two or more cars; also for that portion of loads overhanging idler cars."

Reason: To clarify the intent.

RULE 10

Change second paragraph Sec. (c) to read:

"When boards are specified, use at least one 1 in. by 5 in., for each pair of stakes for load 12 in. or less above top of car sides, and at least two such boards to each pair of stakes for load over 12 in. above top of car sides; *using* three 10-D nails *in each end of each board.*"

Reason: To clarify the intent.

RULE 14

Change Sec. (b) to read:

"*Nails treated to increase holding power, preferred.* The length shall be such as to prevent them being driven through sides or ends of cars."

Reason: To broaden the scope.

RULE 16

Change to read as follows:

"*Loads on One Car Overhanging One or Both Ends—Width, Height and Length.*

(a) Table 1 shall govern in deciding the maximum width according to length of overhanging loads on single cars. For intermediate lengths of cars, not listed in this table, the maximum length and width of overhanging loads as shown for the next longer car shall govern. Determine length of cars by measuring to outside face of end sills. The total length of lading must not exceed the limits as shown in Tables 2 to 17, inclusive—Rule 17.

(b) The overhang is measured from center of truck to extreme end of overhang. For loads over 12 ft. high from top of rail to top of load, the given width must be reduced 2 in. for each inch in height for that portion of load in excess of 12 ft.

Table now in Rule 16, should be changed to Table 1, in the new book."

Reason: To clarify the intent.

RULE 17

Change to read as follows:

"*Weight Restrictions for Loads on One Car Overhanging One or Both Ends.*

(a) Tables 2 to 17, inclusive, shall govern in deciding the maximum weight of loads overhanging one or both ends of a car. Long steel, liable to take permanent set by bending must rest on sufficient bearing pieces to prevent sagging.

(b) Allowable weight on cars of intermediate lengths not specified in tables, should be obtained by adding one-fourth the difference between the weights shown for the next shorter and longer car to the weight shown for the shorter car, for each six inches more than shown for the shorter car.

(c) Allowable weights of intermediate lengths of material not specified in tables, should be obtained by adding one-fourth of the difference in weight shown for next shorter and longer length of material, to the weight shown for the shorter length, for each six inches more than shown for shorter length.

(d) The length of overhanging pieces may be determined by the average length of the pieces in that portion of the load.

(e) Material, uniform weight throughout and uniform length and width of portions overhanging both ends of one car, and not supported on sliding pieces, may be loaded to load weight limit of car."

Reason: To economize for shippers.

RULE 18

Change to read as follows:

"*Load on Two or Three Cars—Width, Height, Overhang.*

(a) The width of load, distance between bearing-pieces, and length of overhang must not exceed the dimensions shown in Tables 18 to 50, inclusive, for loads 12 ft. high or less, measured from top of rail to top of load. For loads over 12 ft. high from top of rail to top of load, the given width must be reduced 2 in. for each inch in height for that portion of load in excess of 12 ft. For loads of uniform width throughout length of load, the minimum width "W" is to apply.

(b) When cars of different lengths are used for the same load, the maximum width of load shall be as shown in the tables for longest carrying car used.

(c) For cars of intermediate lengths not shown in the tables, the maximum width of loads on carrying cars must be governed by the next longer car shown in the tables. Determine length of cars by measuring to outside face of end sills.

Note: The above mentioned tables are based on 10 ft. 6 in. clearance width limits, 15 deg. curvature, and 3 in. tolerance on each side of load."

Reason: Reference to coupler spacing blocks, etc., eliminated account taken care of by new Rule 21. New paragraph (a) provided to eliminate duplicate printing.

Add sketch "Arrangement of Load on Two or Three Cars, per Tables 18 to 50 Inclusive."

Reason: To make it possible to eliminate sketches shown on pages 27, 29, 31, 33, 35, 37, 39, 41, 43 and 46.

Add two columns to Tables 18 to 50, inclusive, to show percentage of permissible load weight.

Reason: To improve the rule.

RULE 19

Both old and new heading, now shown in Supplement No. 2. Eliminate old heading, also the wording "Rule changed to read as follows:"

NEW RULE 21

To read as follows: "Coupler-Preparation of.—Apply coupler spacing blocks, per Fig. 3, and make uncoupling mechanism inoperative per Fig. 4, when load is carried on one or more cars with overhang resting on sliding pieces on idler car, and when load is carried on more than one car."

Reason: To eliminate duplicate printing in other rules and figures.

[The report at this point included recommended changes in loading practice as specified in 39 figures, with the usual objectives of providing better loading, to save shipper expense, economize in printing, etc. These changes applied to Figs. 2, 3, 4, 6, 9, 30, 47, 48, 70, 81, 85, 86, 87, 96, 115, 131, 136, 137, 138, 145, 146, 147, 153, 154, 156, 159, 165, 166, 167, 168, 170, 171, 176, 179, 180, 183, 186, 187, and 188, inclusive. Three new figures, namely, Figs. 201, 202 and 203, were added to provide for the loading of pulp grinder stones on gondola or flat cars, and new Figure 209A, to provide an alternate method of loading boxed automobiles on gondola cars.—EDITOR.]

The report was signed by Chairman Samuel Lynn, superintendent rolling stock, Pittsburgh & Lake Erie; Vice-chairman E. J. Robertson, superintendent car department, Minneapolis, St. Paul & Sault Ste. Marie; R. H. Dyer, general car inspector, Norfolk & Western; G. R. Lovejoy, master mechanic, Detroit Terminal; T. O. Sechrist, assistant superintendent machinery, Louisville & Nashville; C. J. Nelson, superintendent of interchange, Chicago Car Interchange Bureau; H. S. Keppelman, superintendent car department, Reading; W. B. Moir, chief car inspector, Pennsylvania; J. A. Deppe, assistant superintendent car department, Chicago, Milwaukee, St. Paul & Pacific.

Discussion

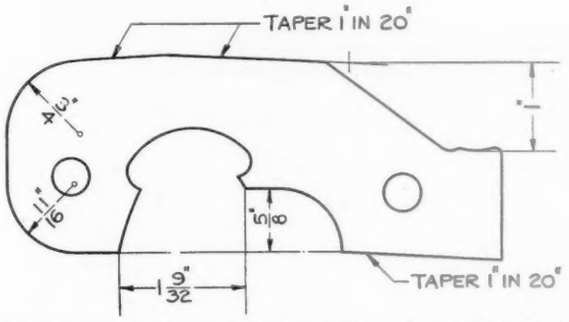
Mr. Lynn, the committee chairman, in presenting the report said that the work of the committee during the past year had largely been devoted to efforts to reduce the cost to the shipper of compliance with the rules. He pointed out the importance to the railways of this item of total transportation cost as a factor in their competition with other forms of transportation. The shippers, he said, are being forced to ask the committee to make changes, which formerly they would not have asked, to meet not only their own requirements but the requirements of their customers. He cited as an instance the matter of loading sheet steel on flat cars because it is cheaper to unload from the flat car than from the other types. This, he said, was one of the subjects now under consideration by the committee. He pointed out that the shippers willingly co-operate with the committee and were going to considerable expense to demonstrate the safety of proposed changes in methods of loading. Much as the committee feels its responsibility in reducing loading costs, he said, every member of the committee has constantly before him as the first consideration in its work the necessity for safety. It was pointed out that the minimum requirements for securing lumber on flat or gondola cars in connection with figure 6 in the committee's report, while this method is an improvement, it still requires additional fastening in the case of dressed lumber to prevent it from spilling. C. J. Nelson of the committee said that the members were aware of this situation and were convinced that it could not be dealt with satisfactorily without additional expense to the shipper. He said that experiments with steel bands, which are now being made, should be encouraged and promised the full co-operation of the committee.

Action.—The report was accepted and the recommendations referred to letter ballot.

Report on Wheels

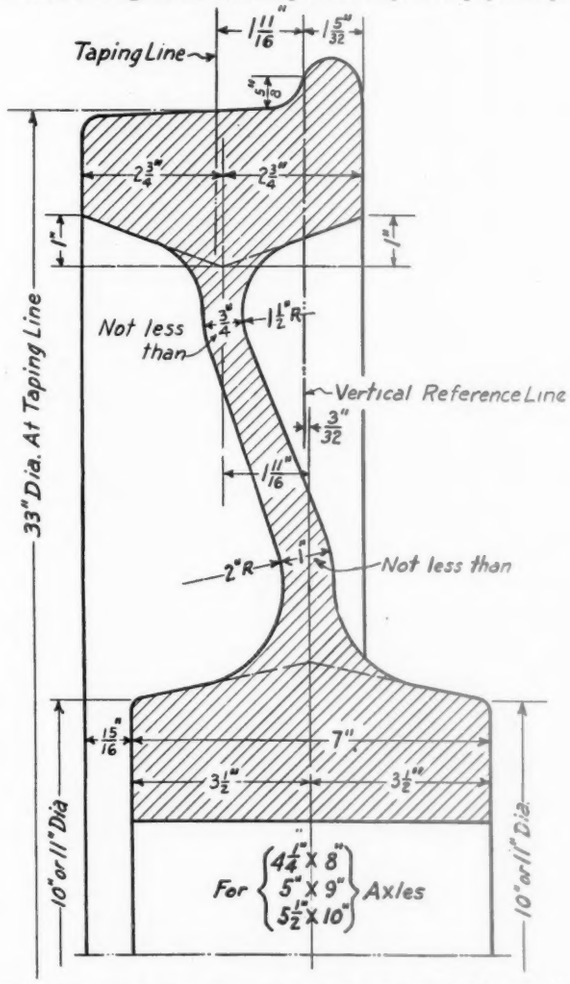
The report includes in Appendix A, a specification for two-wear wrought-steel wheels, having a rim section which conforms substantially to the design of the multiple-wear wheel. This permits measuring service metal with the present standard steel wheel gage. The tread and flange contour of the two-wear wheel corresponds, therefore, to that of the multiple-wear wheel, and in preparing the drawings, consideration was given to revising the tread and flange contour of the multiple-wear wheel with respect to dimensioning.

Accompanying the report are various revised wrought-steel wheel designs as they appear in the Wheel and Axle Manual and also in the Manual of Standard and Recommended Practice. The report calls attention to the continuance of shelled treads as a cause for the premature removal of wrought-steel wheels from service and says that the best results so far obtained in overcoming this difficulty have been by improved methods of heat treatment.



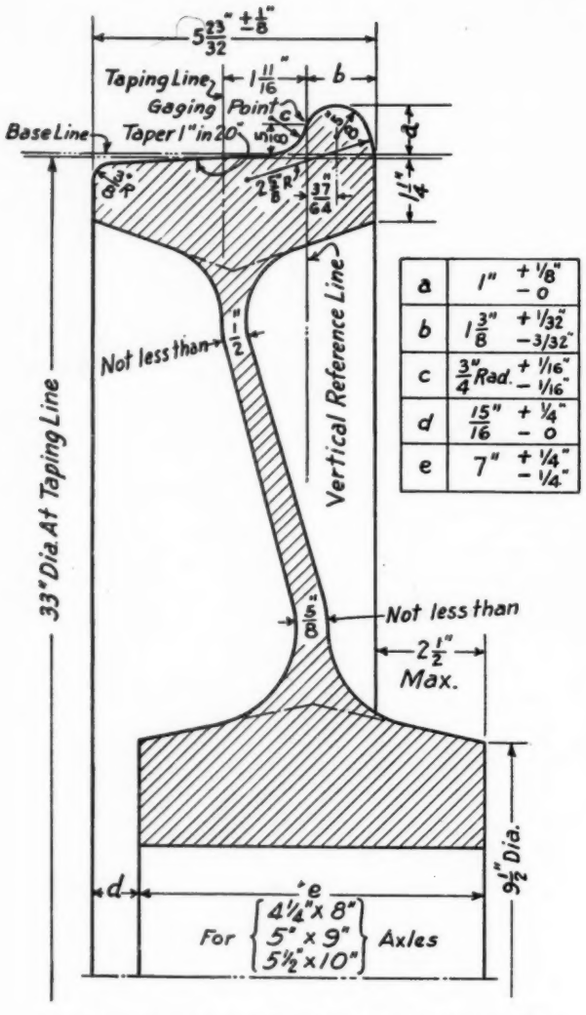
Minimum Flange Thickness, Height and Throat-Radius Gage for New Cast-Iron, One-Wear Wrought-Steel and Cast-Steel Wheels

Outstanding changes in the specifications for cast-iron car wheels, shown in Appendix *B* of the report, are designed to provide improved service properties by changes in such details as rim thickness, heat treatment, flange thickness, tape size, and tread and flange contour. The major change in the rim thickness is an increase from 1⅝ in. to 1⅞ in. for 650-, 700- and 750-lb. wheels, and from 1⅞ in. to 2 in. for the 850-lb. wheel. In heat treatment, increased pitting temperatures and controlled cooling of the wheels provide improved physical properties and make possible a more rigid thermal test by increasing the time limit.



Thirty-Three-Inch Two-Wear Wrought-Steel Wheel Adopted 1936

The maximum flange thickness has been reduced 1/32 in. to conform with that of the one-wear wrought steel wheel. A revised method of indicating the tape sizes of new wheels is recommended in order to permit matching wheels to half tape



One-Wear Wrought and Cast-Steel Wheel Adopted 1934 —Revised 1936

sizes in mounting. A change in dimensions of the tread and flange contour of the chilled-iron wheel is provided to conform with the practice recommended for the wrought-steel wheels.

The report recommends the addition of a paragraph to interchange Rule 71 (owner's responsibility) to condemn flat spots 2½ in. long or over, or two or more adjoining flat spots each of 2 in. in length or over. Certain changes are also recommended to clarify a misinterpretation of freight-car Rule 75 and passenger car Rule 7 (f). The report states that extensive observation of the use of the worn-through-chill condemning gage indicates that it is not fulfilling the requirements, as numerous instances have been observed in which wheels with flattened surfaces condemnable by the gage, are not actually worn through the chill. The report, therefore, recommends certain revisions in Rule 73 and the addition of a new rule 73-A to cover an out-of-round condition. A corresponding revision in the Wheel and Axle Manual is recommended. In Rule 76 covering tread-worn-hollow wheels, it is recommended that the first part of the rule be limited in application to cast-iron wheels and the latter part made to include both wrought- and cast-steel wheels. Also Rule 81 is suggested for revision to include one-wear wrought-steel wheels. Corresponding changes in the Wheel and Axle Manual are recommended.

In view of the damaging influence to lading, track and equipment resulting from flat spots on wheel treads at present high speeds the report recommends that consideration be given during the coming year to reducing the condemning limits for slid-flat spots from 2½ to 1½ in. Before making such a drastic change, however, substantial data must be secured to show what the effects will be upon the movement of cars in transit and the removal of wheels for this defect.

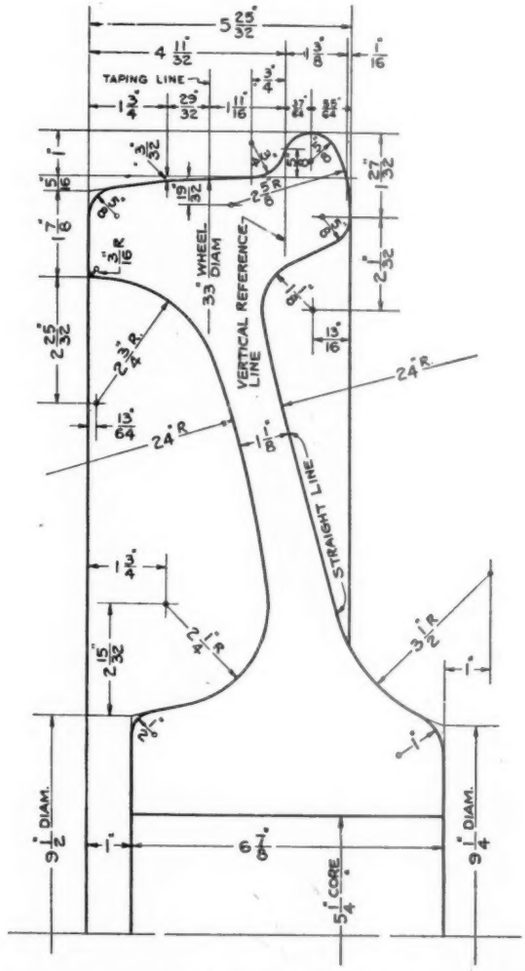
The report states that the master gage for use in connection with wheels and axles is practically obsolete and that it will apparently be necessary to develop go-and-no-go gages conforming to construction tolerances for practically each type of standard gage now in use. The report recommends that the I.C.C. Bureau of Locomotive Inspection be requested, through the proper channels, to revise its Rule 145 to conform with the present A.A.R. Rule and permit the same wear limits for cast-steel wheels in locomotive tender service as have been recognized and demonstrated to be perfectly safe for operation in car service.

In closing, the report expresses appreciation for the cooperation received by the committee during the past year from the Manufacturers of Wrought Steel, Cast Steel, and Cast Iron Wheels. Joint conferences held with these manufacturers' representatives have helped advance the mutual interests of the manufacturers and the users of the different types of wheels.

The report was signed by Chairman R. G. Henley, superintendent motive power, Norfolk & Western; Vice-Chairman F. W. Hankins, chief of motive power, Pennsylvania; C. J. Bodemer, superintendent machinery, Louisville & Nashville; F. H. Hardin, assistant to president, New York Central; J. Purcell, assistant to vice-president, Atchison, Topeka & Santa Fe; and J. J. Tatum, general superintendent car department, Baltimore & Ohio.

Discussion

J. E. Mehan (Chicago, Milwaukee, St. Paul & Pacific) raised a question regarding the necessity of restricting ground wheels to system cars as recommended in the report. Mr. Coddington replied that the privilege of grinding car wheels had been greatly abused; that portable grinders were still being used in certain instances. The committee feels that the restriction is necessary. J. McMullen (Erie) said that if wheels wear out of round, it must be on account of a defective chill and that therefore he doubts the advisability of attempting to reclaim such wheels by grinding. J. W. Burnett (Union Pacific) asked if the committee is investigating the subject of cylindrical versus taper tread wheels, and was informed that wheels of the cylindrical tread type are now under observation but the committee has nothing to report at the present time. H. W. Faus, engineer of tests (New York Central) said that this subject pops up once in every generation and that an examination of the record shows that cylindrical tread wheels have been tried in the past many times and discarded. To make sure that it is not overlooking a bet, Mr. Faus stated that the New York Central



Thirty-Three-Inch 650-Lb. Cast-Iron Wheel for Cars of Maximum Gross Weight not to Exceed 103,000 Lb.

has recently made tests of two standard coaches with four-wheel trucks, one equipped with cylindrical tread wheels in comparative service, and definitely shown that for this type of equipment at least the cylindrical tread wheels are detrimental rather than beneficial. R. L. Kleine (Pennsylvania) stated that his road has 20 multiple-unit cars equipped with cylindrical tread wheels in test service and expects to obtain some definite information regarding comparative performance within a short time. Lawford Fry (Edgewater Steel Company) said that equipment design and roadbed conditions both have a bearing on the question of what type of tread should be used and that experience has shown certain advantages for cylindrical tread wheels on relatively light multiple-unit equipment.

Action.—The report was accepted and referred to letter ballot.

Report on Locomotive Construction

The committee on Locomotive Construction has, during the year, given consideration to the following 12 subjects:

A—Design of fundamental parts of locomotives: (1) Universal joints for operating rods of cab valves, injectors, etc.; (2) Driving wheel centers of thin-wall section type; (3) Safety valves for locomotives; (4) Light-weight pistons.

B—Pins and bushings for brake and spring rigging on locomotives and tenders.

C—Roller bearings for locomotives and tenders.

D—Driving and trailer tires.

E—Exhaust steam injectors.

F—Development and use of oil electric locomotives.

G—Pipe fittings for 300 lb. pressure.

H—Revision of Master Mechanics locomotive front end arrangement adopted in 1906—revised 1936.

I—Standardization of valves.

It is recommended that the following four subjects be submitted to Letter Ballot for adoption as Recommended Practice:

(1)—Universal joints for operating rods of cab valves, injectors, etc.

(2)—Pins and bushings for brake and spring rigging of locomotives and tenders.

(3)—45 deg. and 90 deg. street ell fittings for 300 lb. pressure.

(4)—Revision of Master Mechanics front end arrangement adopted in 1906.

Report has been submitted by L. W. Wallace, Director of Equipment Research, outlining a proposed program for investigation of materials, etc., entering into the construction of locomotive boilers. This proposed program of research is being studied by the committee, and report, with their recommendations, will be transmitted to the Director of Equipment Research when their investigation is completed.

Upon direction from the General Committee, the committee has been giving consideration to the construction of locomotive boilers by the fusion welding process. The committee has also cooperated with G. S. Edmonds, superintendent motive power, D. & H., in connection with the design of a fusion-welded boiler authorized for construction by that company. The design and specifications for this boiler have been approved in a report to the General Committee.

Universal Joints for Valve Operating Rods

After studying the design of universal joints used by various roads for the operation of cab valves on locomotives, as well as those for injectors, your committee recommends, for locomotive use, universal joints composed of members as shown in Figs. 1 to 4, inclusive.

[In addition to detail drawings and tables which are omitted in this abstract, the report showed various combinations and applications of the joints in Figs. 5 to 7, incl.—EDITOR.]

The subcommittee report was signed by H. H. Lanning (chairman), Geo. McCormick, C. Harter, D. S. Ellis, and A. H. Fetters.

Driving Wheel Centers With Thin Walls

In 1934 and 1935, your committee included a statement of roads which had applied driving wheel centers of the thin-wall section type and gave information as to diameter of wheels, type of locomotives, etc., on which these were in use. This statement has been brought up-to-date as of March 1, 1936, and is herewith submitted. The tabulation shows that since the last report there has been a total increase of all makes of thin-wall driving wheels of 500.

[Tabulated data showed applications to date of 342 wheel centers of the Scullin type on 146 locomotives, 854 of the Boxpok type to 208 locomotives, 16 of the box type (L.M.F. design) on six locomotives, four of the Birdsboro type on two locomotives, two of Univan type on one locomotive and 12 of the Duquesne type on six locomotives.—EDITOR.]

Inquiry as to the service rendered by different types of special wheel centers has been made of the roads using them and your committee finds that, with few exceptions, the service rendered is satisfactory. A few defects have been reported but were said to be of a nature common to steel castings and the number smaller than would be expected of an equal number of steel castings of ordinary design. The defects in most cases have been confined to original designs. Manufacturers have made improvements and reinforcement in design, with no trouble reported on latest types.

While marked progress has been made in the application of special design of wheel centers, nine roads express the opinion that this type is still regarded as in the experimental stage, while nine other roads consider it as past the experimental stage, with four roads non-committal. In view of this division of opinions, the committee offers no definite conclusions or recommendations.

The subcommittee report was signed by H. H. Lanning (chairman), Geo. McCormick, C. Harter, D. S. Ellis, and A. H. Fetters.

Safety Valves

In 1934, your committee rendered a progress report on safety valves which evoked some criticism with regard to the material, viz., brass, which was specified for safety valve sleeves also with regard to the methods recommended for determining the aggregate discharge capacity of safety valves for any particular locomotive boiler.

In view of the criticism with respect to materials for sleeves to be used in applying safety valves to locomotive boilers, the committee wishes to revise par. 13 of the 1934 progress report to read as follows:

"Safety valves shall be of the female type and applied to suitable sleeves of brass or steel, the sleeves to be screwed into the boiler or steam dome. Threads of safety valve bases and sleeves are to conform to the railway company's standards."

In criticizing the formula for obtaining the aggregate safety valve capacity, viz.:

5.75 × Heating surface (sq. ft.) = Required aggregate discharge capacity

some expressed the belief that this would give values entirely too low for compliance with I. C. C. Rule 34, which provides for a rise of not more than 5 per cent above the allowed steam pressure.

An evaporation rate of 5.75 lb. of water per square foot of heating surface has been used for years by some of the larger manufacturers of safety valves, and experience with valves proportioned according to this formula has demonstrated that they afford sufficient relieving capacity for boilers of ordinary construction.

Safety valve requirements for locomotive service differ from those in stationary service in that the rates of draft and combustion, under maximum working conditions, are directly proportional to the steam consumption of the cylinders, whereas in stationary service draft is generally produced independently of steam consumption and there is no automatic relation between consumption and the rate of combustion. In a locomotive boiler, therefore, it is only necessary to provide sufficient safety valve capacity to discharge the steam which can be generated over and above the output to cylinders and auxiliaries, whereas in stationary service it is frequently necessary to provide for the maximum evaporative capacity of the boiler.

Conditions under which the amount of steam to be handled by the safety valves of a locomotive becomes maximum seem to be realized in a coal-burning locomotive when the engine is stopped suddenly after running for a considerable period under conditions which require the maximum rate of combustion. Under these conditions, the radiant heat from the fire maintains, for a short period, a rate of evaporation that may, and probably does, approximate the evaporation attained under working conditions; hence the need for special consideration and possibly tests to determine the correct safety valve capacity for a boiler having unusually large grate area.

In an oil-burning locomotive under the same conditions, the cessation of draft which accompanies the closing of the throttle automatically reduces the rate of combustion, as well as the firebox temperature, and compels an immediate reduction in the rate at which fuel is supplied to the firebox; hence in oil-burning service the maximum steam generation to be considered in determining safety valve capacity is that which can be maintained when the fire is forced by the blower with steam from an outside source and all steam outlets from the boiler are closed.

In recognition of the fact that many locomotives constructed during recent years have been provided with boilers having unusually large grates and fireboxes, the committee qualified its recommendation by including the following paragraph in the 1934 report:

"For boilers having large grate area or short flues, the evaporative capacity should be calculated according to the formulae commonly used

for determining boiler capacity in connection with steam consumption of locomotive cylinders, and, in cases of doubt or boilers of unusual construction, the evaporative capacity should be determined by actual test."

If there is any error in the above recommendation regarding boilers of unusual construction, the error lies in the statement that the evaporative capacity of boilers having large grates or short flues "should be calculated according to the formulae commonly used for determining boiler capacity in connection with steam consumption of locomotive cylinders." It is extremely doubtful whether there exist any locomotives which would require safety valves of sufficient capacity to discharge as much steam as would be indicated by the application of Cole's ratios; hence the committee now suggests that the word "may" be substituted for the word "should" in the second line of the above quoted recommendation.

The committee has given consideration to the possibility of standardizing the working parts of safety valves but has reached the conclusion that, in view of the patent situation involved, the recommendations given in the 1934 report with regard to dimensions and construction are all that should be considered at this time.

The subcommittee report was signed by H. H. Lanning (chairman), Geo. McCormick, C. Harter, D. S. Ellis, and A. H. Fetters, Sub-Committee.

Light-Weight Pistons

The 1934 report included a statement of roads which had applied light-weight pistons of the type in which the packing rings perform the function of a bull ring and carry the weight of the piston. This statement gave data as to the number of locomotives equipped, type of locomotive, cylinder dimensions, average mileage per month, etc. This statement has been brought up to date as of March 1, 1936, insofar as replies have been received, and is included as Statement "A."

[Statement "A" which includes 4,022 locomotives on 10 roads has been omitted.—EDITOR]

The Canadian National now has 602 locomotives equipped with the design shown as Fig. 1 in the 1934 report, no changes having been made.

The D. & R.G.W. now has 70 locomotives equipped with the design shown as Fig. 4, the only change being the abandonment of the bull ring and the adoption of a one-piece nickel steel piston.

At least three roads, the B. & M., L.V., and C. & O. have, during the past year, applied pistons developed by the Hunt-Spiller Company. These pistons are of the conical type but the spider and bull ring have been combined in an integral casting of gun iron. The packing rings are of a special sectional design, the segments being forced outward in contact with the cylinder walls by hooplike flat steel springs.

The pistons in the streamlined 4-6-4 type locomotive, Commodore Vanderbilt of the New York Central, are of interest because of the extremely light design made possible by the use of high-tensile steel. The construction of this piston is illustrated in Fig. 8 (omitted). While equipped with these pistons the Commodore Vanderbilt had run 43,200 miles as of March 1, 1936, and the service rendered by the pistons is said to have been satisfactory.

Your committee expects to keep in touch with future developments in light-weight pistons and will report developments as they occur. We have also accumulated data with regard to the light-weight piston valves and expect to report on that subject next year.

The subcommitte report was signed by: H. H. Lanning (chairman), Geo. McCormick, C. Harter, D. S. Ellis, and A. H. Fetters.

Pins and Bushings for Brake and Spring Rigging

The subcommittee submits the following for Recommended Practice. In preparing this information the locomotive builders and the pin and bushing manufacturers were consulted.

Because of the wide variations in diameters of pins and bushings now in use, it was the conclusion of the committee that stock sizes could be reduced, and it is, therefore, recommended that the following sizes of pins and bushings be adopted as Recommended Practice:

[The table includes bushings with inside diameters from ¾ in. to 1½ in. in steps of ⅛ in., from 1½ in. to 3 in. in steps of ¼ in. and from 3 in. to 4½ in. in steps of ½ in. Bushings having inside diameters up to 2¼ in. have walls 3/16 in. thick, those from 2½ in. to 3 in. have ¼ in. walls and larger sizes have 5/16 in. walls.—EDITOR]

The tubing used for bushings to be accepted with present manufacturers' mill tolerance for diameters, both inside and outside.

All pins are to be finished to not more than 1/32 in. less than nominal diameter.

The material entering into the construction of the pins and bushings to be of a type that can be case-hardened.

The approximate tonnage for pressing in bushings to be on the basis of two tons per inch of outside diameter of bushings. If necessary, the hole to be trued with nominal size straight reamers to suit diameter required.

Pins and bushings to be case-hardened to 1/32 in. minimum depth and to be equivalent to 60 Rockwell C schedule.

This committee suggests that the subject of material used in pins and bushings be referred to the Committee on Specifications for Materials.

The subcommittee report was signed by: G. H. Emerson (chairman), C. Harter, W. F. Connal, J. E. Ennis, H. P. Allstrand and S. S. Riegel.

Roller Bearings

This report covers steam and electric locomotives for a period, December 1, 1934 to December 1, 1935, but does not include Diesel-electric locomotives or high-speed streamline trains.

Replies to questionnaire were received from 125 roads, 36 of which reported applications of roller bearings. It is evident that progress has been made during the past year in extending the use of roller bearings to engine truck, driver, trailer truck and tender truck axles. New applications, including applications which have been authorized but not yet applied, are as follows: 314 engine truck axles and 390 driving axles on electric locomotives and 111 engine truck axles, 70 driving axles, 31 trailer truck axles and 1,104 tender truck axles on steam locomotives. Only two engines have been equipped during the year with roller bearings on side rods and main rods and 14 engines had roller bearings applied to various minor valve gear and auxiliary parts. One road has placed orders for 15 4-6-6-4 locomotives which are to be equipped with roller bearings on engine truck, trailer truck and tender axles. Another road has recently ordered 12 4-6-6-4 locomotives, eight of which are to be equipped with roller bearings on engine trucks, drivers, trailer trucks and tender trucks.

Roller bearing failures during the past year were comparatively few and consisted chiefly of worn rollers and cracked and worn races.

Unfortunately, with the introduction of roller bearings, there was not sufficient background of experience regarding the nature and degree of stresses set up in axles by the changed conditions due to substituting roller bearings for plain bearings, consequently considerable trouble has been encountered with broken and failed axles, particularly those of inboard bearing type.

The question of increased speeds also has an important impress on the problem of axle design for roller bearings. Experience gained the last two or three years with axles in high speed streamline train service as well as high-speed electric service has demonstrated that axle stresses increase in a fast ascending ratio for speeds above 70 m.p.h. and that the conventional formula for axle fibre stress cannot be fairly used at these higher speeds.

Whereas freight car axles are designed to carry a maximum of fibre stress, 22,000 lb. per sq. in. and passenger car axles are in general operated at from 80 to 90 per cent of this stress, it is becoming apparent from axle failures at higher speeds that fibre stresses should not be higher than 12,000 lb. per sq. in. for speeds of 100 m.p.h. In addition to this there are certain stresses introduced in roller bearing axles that do not occur when plain bearings are used. On the other hand, roller bearing axles are free from stresses due to overheating that occur with plain bearings.

In steam locomotive service, investigations by various roads have shown that fatigue cracks appear in axles after 300,000 mi. or more of service and for this reason some roads have placed a mileage limit of 250,000 to 300,000 mi. for renewal of roller bearing axles. One road reports that they periodically test axles by magnetic examination. Some roller bearing manufacturers have conducted exhaustive studies into the causes surrounding the fatiguing of axles, with the result that a redesigned axle has been recommended, consisting of an overall increase in diameter and the placing of pressed-fit members, such as the wheels and bearing races, on large diameter of the axle.

Some of the redesigned axles have been applied, but have not had sufficient service to arrive at definite conclusions, however, the subcommittee hopes to have additional information for the next report.

The subcommitte report was signed by: A. H. Fetters, R. G. Bennett, and W. F. Connal.

Driver and Trailer Tires

This committee, with the co-operation of members of the Technical Committee of Tire Manufacturers Association has reviewed reports from roads in locomotive and trailer tire failures covering the period of December 1, 1934, to December 1, 1935. The data were supplied by 128 roads, of which 59 repre-

senting 35,458 locomotives in service, reported 613 tire failures for the year, and 69 representing 2,498 locomotives, reported no failures. Of the failures 212 were attributed to the manufacturing process, 238 to railroad responsibility and 163 not classified.

It is apparent that some roads did not thoroughly investigate and reach definite conclusions as to the cause of tire failures. While there has been an improvement since calling attention to this matter last year, the fact remains 26 per cent of the failures reported since that time were discarded because of lack of information. It is important that this be given greater consideration by all reporting roads for the ensuing year.

Shelled Treads—Tabulation of the causes of tire failures shows a large number of defective tires due to shelled treads. It has been previously indicated that only tires which were shelled out more than 3/8 in. should be reported. Due to variations in reports and the fact that a number of roads made no report of shelled out tires, leads us to believe that many shelled treads are turned before they reach 3/8 in. in depth, and, therefore, not reported. One road reported 42 trailer tires, another road 47 trailer tires removed on account of shelled treads in excess of 3/8 in. in depth. This emphasizes the importance of making a more careful investigation of this type of defect. Your committee has asked the secretary in procuring data for the period June 1, 1936, to December 1, 1936, to request reporting roads to keep, and make report of all tires which have to be removed from locomotives and trued up in a lathe or discarded by reason of shelling. The reporting road will give depth of shelling, whether wheel center was of solid or spoke design, and in the case of trailer tires whether the locomotive was equipped with a booster and/or brakes. This modifies previous instructions relative to a 3/8 in. limit, but the additional information is required to enable us to arrive at a definite conclusion if possible as to the cause of shelled treads and the method which must be followed to minimize this type of failure.

The subject of shelled treads has been discussed with the Technical Committee representing the Tire Manufacturers, particularly as to whether they should be considered under the heading of railroad or manufacturing responsibility. The result thus far has been a memorandum on "The Problem of Shelling in Locomotive Tires and Wheels" submitted by the Tire Manufacturers Technical Committee.

[The memorandum referred to is a lengthy discussion of shelled treads and included with it are illustrations and photomicrographs of treads with this defect.—EDITOR.]

Heat-Treated Tires—The practicability and economy in the use of heat treated tires has also been given consideration. We are advised by the Tire Manufacturers Technical Committee that:

"The application of heat-treated tires is still in a state of development. The earliest applications were made on trailer wheels in an endeavor to minimize shelling where particularly severe service conditions were to be met. The treatment was chosen to give as great an increase in hardness and strength as possible, with ductility as high as or higher than that of the untreated tires. These tires have continued to give satisfactory performance for a number of years in trailer service.

"More recently a number of roads have applied heat-treated locomotive driving tires with physical properties similar to those of trailer tires in the hope of securing greater mileage between turnings. In many cases satisfactory results have been obtained, but there is considerable evidence to the effect that with heat treatment giving a high degree of hardness it is important that the tire shall be fully and uniformly supported by the rim of the wheel. If the support given to the tire is not uniform because of distortion of the wheel center, improper shimming or other causes, the tire is subject to flexure at the unsupported points. In addition the bore of the tire at these points may be subject to corrosion which greatly reduces the fatigue strength of the tire section. A tire of low elastic limit may distort permanently and adapt itself to the contour of the center, while a treated tire of higher elastic limit may be subject to continued flexure leading to failure. A considerable number of the failures of heat treated tires are attributable to this cause.

"As the use of heat treated driving tires is still in progress of development definite specifications cannot be set up. It is the belief that when more information is obtained from service tests definite standards may be possible."

It is therefore essential that those reporting roads who are using heat-treated tires keep this committee informed with regard to the failures they are experiencing, with such additional information as may be helpful in pursuing this subject.

Shop Practices—Your committee is doubtful as to whether mechanical officers, or their responsible subordinates, generally appreciate the large number of tire failures traced to cracks in the bore, developing from rough tool marks, nicks and corrosion, wheel centers out of round, and welding and torch burns.

The mechanical officer of one railroad operating over 2,000 locomotives reached the conclusion all the tire failures on his road for the year were due to faulty shop practices. These failures can be much reduced by ordinary care, precaution and proper shop practices.

This committee wishes to acknowledge the co-operation of the tire manufacturers for their assistance. Important data have been gathered thus far and the investigation should be continued. The value of this study will finally depend on the thoroughness of reporting roads in investigating and correctly allocating the causes of their tire failures in future reports.

[Accompanying the report was a comprehensive tabulation of the tire failures reported for the year ended Dec. 1, 1935.—EDITOR.]

The subcommittee report was signed by R. G. Bennett, W. I. Cantley, J. E. Ennis, E. E. Chapman and T. C. Sedwick.

Exhaust-Steam Injectors

Feedwater Heaters—Until this year the subject of feedwater heaters and exhaust-steam injectors has been carried on the docket, but in view of the almost universal application of feedwater heaters to new power and existing modern power, it is the view of the Locomotive Construction Committee that feedwater heaters are no longer experimental devices, and should be dropped from the docket.

Exhaust-Steam Injectors—During 1935 there was little activity in the field of exhaust steam injectors. One road reported six applications and another road reported four applications. One road has recently ordered 15 4-6-6-4 locomotives, five of which are to be equipped with exhaust steam injectors.

Another road reports that the Turbo type injector in use has been giving satisfactory service but they have made no comparative tests to determine economy obtained.

This is submitted as a progress report and it is the intention to continue to investigate these devices.

The subcommittee report was signed by A. H. Fetters and W. I. Cantley.

Oil-Electric Locomotives

Your committee has continued investigations of developments and submits statement showing the number of Diesel-electrics in service in the United States and Canada as compiled from statistics and records of installations of various units. [Table shows 192 locomotives installed since 1925.]

Statement includes 46 oil-electric battery locomotives operated from both internal power generated by Diesel engines as well as external power obtained from trolley or third rail connections but does not include gas-electric nor butane-electric locomotives.

About 85 per cent are 300 to 600 hp. capacity which evidently are considered most favorable for general switching assignments as with the higher ratio of tractive effort per total weight of locomotive obtainable from oil-electrics, it is possible to substitute them for steam locomotives of 800 to 1200 potential horsepower ratings and effect economies in operation by lower fuel rates and savings of wages and enginehouse expense. However, to obtain the greatest savings it is essential that the oil-electric units are operated in service assignments of 16-24 hours per day.

Recent installations show that heavier types of oil-electric locomotives, 900 to 1200 hp. capacity are being used in switching and transfer service and larger units of 1,600 to 2,000 and 3,600 hp. are being introduced into road and helper service, but the initial cost of the larger units will require assignments from which greater locomotive mileage per annum can be obtained than possible with the steam locomotives replaced. Improvements in design and construction are evidenced in the most recent Diesel-electrics which with higher availability assured and increase of locomotive miles per annum attained, economic operations can be anticipated.

We have made no comparisons of operation costs per hour or per locomotive mile for any oil-electrics of any ratings since their work assignments, power factor developed, territorial locations, etc., govern these costs to a considerable extent, and actual costs of operations would not be comparative except under precisely similar conditions.

The average service life of these locomotives or cost of repairs also cannot be consistently estimated or computed from information available and considerably more performance and development information must be available to establish these characteristics.

In addition to this some roads are using types of Diesel-powered trains. Since the Union Pacific streamliner, and the Burlington "Zephyr" streamlined units—both Diesel-driven trains—made their appearances, the "Comet," the "Flying Yankee," "The Rebel," "Royal Blue," "Green Diamond," "City of Portland," and similar trains have come successfully into use and doubtlessly much progress will be made with such Diesel powered trains in the future.

The subcommittee report was signed by S. S. Riegel (chairman), W. F. Connal, and W. I. Cantley.

Your committee has considered the proposal that we include

the 45 and 90-deg. street ell fittings with the 300-lb. unions and fittings of the nut and nipple type adopted for recommended practice in 1931.

Railroads canvassed develops the fact that there is a general demand for this type of street ell fitting, although a few roads do not use them.

We, therefore, believe it is consistent to include them in this standard, then adopted, and so recommend, leaving their use optional, and in that connection submit the attached illustrations, dimensions and characteristics of the sizes recommended for the 45 and 90-deg. street ells to be included. [Drawings omitted.]

The subcommittee report was signed by S. S. Riegel (chairman), W. I. Cantley, and J. E. Ennis.

Master Mechanics Front End Arrangement

The subcommittee appointed to consider a revision of the design known as the "Master Mechanics" front end as described in the 1906 proceedings of the American Railway Master Mechanics Association submitted a comprehensive report based on recent standing and roads tests made while redrafting various classes of bituminous coal burning locomotives.

The details of the smokebox and arrangement of the "Master Mechanics" front end design consist of an exhaust stand with round-bore exhaust nozzle, smokestack and stack extension bolted together, a diaphragm plate or vertical back deflecting plate, a table plate supported by the exhaust stand and attached to the diaphragm plate and sides of the smokebox, an adjustable draft sheet attached to the table plate, and smokebox netting attached to the table plate and the interior of the smokebox and usually applied in a sloping position.

From a study of the gas areas of properly drafted locomotives and observations made while redrafting, it was discovered that there is a definite and necessary relation of these areas to each other and that this relation is practically identical on all the locomotives redrafted. It has been considered logical, therefore, to use one of these areas, namely, the minimum net gas area through the tubes and flues, as an index to which the other gas areas, including the minimum area of the smokestack, should be compared and proportioned.

The best results have been obtained where the gas areas were kept within the percentage ranges indicated in the table.

Recommended Gas Areas

	Percentages	
	Preferred	Permissible Limits
Net, tubes and flues	100	100
Over arch	115	110–120
Under table plate, maximum	95	95–110
Under table plate, minimum	85	80– 95
Under draft sheet	75	65– 80
Through netting	130	110–140
Stack, minimum	25	23– 27

Comparison of stack diameters determined by the method recommended with the diameters of existing stacks or stack diameters determined by other methods in general use discloses in a majority of cases that larger stacks may be used. The use of larger stacks permits the use of larger exhaust nozzles with subsequent reduction in back pressure. Reduction in back pressure, when accompanied by satisfactory steaming qualities and fire conditions, results in a saving of fuel. Other advantages of reduced back pressure are increased drawbar pull and a reduction in the maintenance costs.

[Accompanying the report were a number of drawings and tabulations with definite instructions as to the methods to be followed in drafting a locomotive in accordance with the recommendations of the subcommittee.—EDITOR.]

The subcommittee report was signed by D. S. Ellis (chairman), and A. H. Fetters.

Standardization of Valves

Upon request, a survey was made as to the attitude of the railroads in connection with the standard A. A. R. 300-lb. globe and angle valves, and the information received indicates that out of 106 roads reporting, 53 stated that they have adopted the valves as standard, 10 propose to adopt, 26 have not adopted nor propose to adopt, and 17 were indefinite. The 63 roads which have adopted or propose to adopt the valves as standard represent 33,022 locomotives out of a total of 48,767 locomotives.

The subcommittee report was signed by J. E. Ennis (chairman), S. S. Riegel, and W. I. Cantley.

The full report was signed by W. I. Cantley (chairman), mechanical engineer, L. V.; H. H. Lanning (vice-chairman), mechanical engineer, A., T. & S. F.; R. G. Bennett, general superintendent motive power, Penna.; G. McCormick, general superintendent motive power, S. Pac.; W. F. Connal, mechanical engineer, Can. Nat.; G. H. Emerson, chief motive power and equipment, B. & O.; A. H. Fetters, general mechanical engineer, U. P.; J. E. Ennis, engineer assistant, N. Y. C.; S. S. Riegel, mechanical engineer, D., L. & W. (deceased); D. S. Ellis, mechanical assistant to vice-president, C. & O.; C. Harter, chief mechanical engineer, Mo. Pac., and H. P. Allstrand, principal assistant superintendent motive power and machinery, C. & N. W.

Discussion

Mr. Cantley introduced the chairmen or other members of the subcommittees, who made the presentations of the various parts of the report. With respect to driving wheel centers with thin walls, the question was asked whether difficulty had been experienced with higher hub temperatures with the new wheels. Representatives of the Missouri Pacific, the New York Central and the Chesapeake & Ohio reported no trouble from this source. The Chicago & Eastern Illinois reported six failures of the early design of this type of wheel center. The redesigned wheels with which the failed wheels had been replaced had given no trouble after two years in service.

The section of the report on roller bearings drew forth considerable discussion in answer to a request from the floor for descriptions of the axle troubles which had been experienced on locomotives equipped with roller bearings. The difficulties on several roads for which representatives spoke all arose within the portion of the axles covered by the bearing and were diagnosed as starting from detail checks or fractures in the surface of the axles adjoining the edges of the inner bearing races which are shrunken on. More trouble is experienced with inboard bearings than with those on the outside of the wheel. W. H. Flynn (New York Central), who reported trouble of this kind, said that it had been overcome by new designs, and expressed great confidence in the bearings. D. S. Ellis (Chesapeake & Ohio) reported that on inspection of engine truck axles fitted with roller bearings at the time of each Class 3 repair it was found necessary to remove all axles from this cause.

A. H. Fetters (Union Pacific) called attention to the effect on the stresses on the axle of the shrinking on of races and spacer rings; an effect which might produce stresses at the surface of the axle in excess of its elastic limit. He said it had been suggested that rolling of axle surfaces at these ring seats might improve conditions by increasing the strength of the material. H. W. Faus (New York Central) doubted the value of the cold rolling process because the resulting sacrifice of ductility of the surface metal tends to reduce its fatigue strength and make it more susceptible to the effect of any slight surface scratches which might be present. The only information, he said, on which to judge the effect of the cold rolling process is that obtained from endurance tests with small, highly polished specimens, results of which admittently would be severely affected by the slightest surface defect and in which ductility is of less importance than in the case of axles.

Another subject which drew forth more than ordinary comment was that of driver and trailer tires. The committee stressed the handicap it suffered from the lack of adequate information in the reports of shelled treads which railroads are sending to the committee. D. J. Sheehan (Chicago & Eastern Illinois) related a number of the peculiar circumstances which have been noted in connection with shelled-out trailer tires on that road, many failures from which cause were experienced during the past winter. About 85 per cent of all of the failures, he said, occurred on one class of Mikado type locomotives in fast freight service. Of the failures on this class of power 93 per cent occurred on the left side of the locomotive. He said that he had found others were experiencing the same peculiarity. The only condition he could find which would seem to have any relation to this peculiarity was the fact that on a double-track railroad the inside track rail, on which the left-hand wheels run, is less flexible than the outside rail.

Lawford Fry (Edgewater Steel Company) expressed the opinion that the increase in tread failures is due to increases in speed and load. On one road for which he had the data he said that the number of shelled tread failures in 1935 was twice as great as in 1934. That this was not the result of changes in reporting was indicated by the fact that failures caused by shattered rims, a defect for which the manufacturer is clearly responsible, were the same in both years. The facts available indicate that the failures probably averaged about one-half per cent of the wheels in service per year. He also presented data indicating that the failures from tread shelling on tenders were much greater on the leading axles of each truck and much greater on the front truck than on the rear truck. He pointed out that the solution does not lie with the metallurgist alone but must include a study of the mechanical design of the equipment.

J. W. Burnett (Union Pacific) said that locomotive tire failures studied on the Union Pacific occurred in tires which had received their last turning. The practice on that railroad, he said, is to fit tires to individual wheel centers and not to permit the use of shims. To this he attributes their present lack of failure. He expressed the opinion that the major responsibility of developing a steel wheel suitable for all around service rests upon the manufacturers. C. Cromwell (Baltimore and Ohio) said that

his railroad had experienced practically no trouble from tire failures. He mentioned a few failures of trailer tires through the bolt holes where they were bolted to the rim of the wheel. This road, he said, turns up the wheel centers when new tires are required and fits the tires to the center.

In connection with Exhibit H, covering the revised master mechanics locomotive front and arrangement, L. Richardson, (Boston and Maine) mentioned some excellent results being secured with annular ported nozzles on that road. Mr. Fetters stated that in general the drafting ratios proposed in the report will result in good steaming locomotives. He said that all types of stack and nozzle combinations have been tested on the Union Pacific, the best results being secured with the multiple-ported nozzle with which a vacuum of about one inch is secured per pound of back pressure.

Action.—The report was accepted and the recommendations referred to letter ballot.

Report of Arbitration Committee

As a result of letter-ballot action in 1933, the coupler manufacturers were directed to scrap their patterns for Type D coupler bodies, due to the Type E coupler having been adopted as Standard by the Association in 1931 as a distinct improvement over Type D coupler. However, the manufacturers continue to receive orders for the latter type and, upon suggestions by the Committee on Couplers and Draft Gears, a new requirement is recommended under Rule 3, effective January 1, 1937, prohibiting Type D couplers cast after August 1, 1936, on all cars in interchange.

A second new requirement is recommended under Rule 3, making the defect card receptacle mandatory for cars built new or rebuilt on or after January 1, 1937, as a safety measure and to facilitate inspection in interchange. The cost is little more than for the cardboard used for this purpose and many recommendations urging the use of the receptacle have been received from railroad clubs and car inspectors.

No further extension in effective date beyond January 1, 1937, has been recommended for requirement in Freight Rule 3 for the A.A.R. Standard draft key retainer, or approved equivalent. This recommendation is in the interest of safe operation and has the concurrence of the General Committee. No further extension in effective dates beyond January 1, 1937, has been recommended for requirements in this rule concerning stake pockets on flat cars. No requests for extension of these dates have been received and the committee feels ample time has elapsed to permit compliance. In accordance with 1934 letter ballot action, no further extension beyond January 1, 1937, will be granted for requirement prohibiting acceptance of Class E-4 cars from owners.

In accordance with recommendation by the Committee on Brakes and Brake Equipment, as approved by letter ballot last year, recommendations for modification of Rules 19 and 62 are submitted, to provide that, effective January 1, 1937, the new reinforced-back brake shoe per 1935 specification, must be used in repairs to foreign cars to justify bill.

Upon recommendation by the Joint Subcommittee on Material Charge for Secondhand Details, consisting of representatives of the Mechanical and Purchases and Stores Divisions, your committee has listed fifteen additional items for which charge is recommended on basis of 50 per cent of value new, when applied, secondhand, in repairs to owner's defects or on authority of defect card. It is felt this basis provides an equitable allowance for such secondhand material.

No further extension in effective date beyond January 1, 1937, is recommended for the requirement in Passenger Rule 2 which provides that cars other than passenger-carrying equipment must be equipped with metallic steam-heat connectors. No requests for extension of this requirement have been received and it is felt sufficient time has elapsed to permit compliance insofar as the above cars are concerned. In the case of passenger-carrying equipment, a one-year extension in effective date is recommended.

The committee does not feel that any of the modifications included in its report necessitate submission to letter ballot, the majority of them being routine and covering changes recommended by the Committee on Car Construction, Committee on Couplers and Draft Gears, Committee on Brakes and Brake Equipment and the Committee on Tank Cars, extension of effective dates of various requirements and changes necessitated by letter-ballot action last year.

The matter of complaints as to failure of secondhand brake beams was referred to in the 1935 report, with advice that a specification for reclaimed beams had been prepared by a joint subcommittee (consisting of members of the Arbitration, Brake and Car Construction committees), and that the report of this joint subcommittee had been approved, subject to review of prices by the Committee on Prices for Labor and Materials and approval of the method of repairs by the Committee on Car Construction. These recommendations will appear in the 1936 report of the Committee on Brakes and Brake Equipment. If the specification is approved by letter ballot, this committee will immediately formulate the necessary changes suggested for the Interchange Rules.

During January, 1932, an investigation of the cost of accounting for car repairs was authorized by the Board of Directors of the Association and conducted under the direction of your committee. Copy of progress report of this investigation was mailed to member roads in July, 1933, and dealt, specifically, with the question of establishing central or regional clearing houses for the preparation and checking of car repair bills. Final report of the Special Subcommittee on Economies in connection with Cost of Billing for Foreign Freight Car Repairs, which also deals with the question of elimination of car repair billing, has been submitted and both the report and conclusions reached were unanimously approved by the General Committee. Copies of this final report were distributed to member lines on February 26, 1936. An abstract of same has been prepared and is printed as Exhibit B to this report.

All recommendations for changes in the Rules of Interchange submitted by members, railroad clubs, private car owners, etc., have been carefully considered by the committee and, where approved, changes have been recommended.

Attention is again directed to the fact that the Arbitration Committee will not consider questions under the Rules of Interchange unless submitted in the form of Arbitration Cases as per Rule 123.

Freight Car Rules

RULE 3

The committee recommends that effective dates for various requirements in the present rule, as listed below, now set at January 1, 1937, be extended to January 1, 1938:

Section (a) Paragraph (7)—Axles under 70,000 lb. capacity cars.

Section (b) Paragraph (6)—Brake-beam hangers with eyes not formed solid.

Section (b) Paragraph (8)—Bottom-rod and brake-beam safety supports.

Section (r) Paragraph (3)—Hatch covers to be secured by hinges.

Section (t) Paragraph (8)—Head-block anchorage on tank cars.

Section (t) Paragraph (9)—Wood shims between longitudinal anchorage and underframe, on tank cars.

Section (t) Paragraph (14)—Dome covers secured by hinge or chain, on tank cars.

Section (t) Paragraph (16)—Class I tank cars prohibited in interchange.

The committee recommends that Paragraph (3) of Section (t) of this rule be modified to add *excessive corrosion* to the conditions which prevent the substitution of second-hand cast steel truck side frames.

The committee recommends that Paragraph (15) of Section (t) of this rule be modified by substituting the term *car structure* for *underframe* and by replacing the reference to the A.A.R. Specification for *Class III, Tank Cars, effective May 1, 1917, to July 1, 1927,* with reference to Specifications for *Tank Cars, effective March 1, 1931.*

The committee recommends that the first note following Paragraph (1) of Section (u) of this rule be modified by adding the words *or equivalent strength* at the end to accord with the fact that with the use of Cor-Ten steel the net area of center-sill section may be reduced from 21.3 sq. in. to 17 plus sq. in., this being in proportion to the characteristics and physical properties of the material.

RULE 4

The committee recommends that Paragraph (1) of Section (h) of this rule be modified as follows:

Proposed Form—(h) (1) Tank cars. Sheets, heads or domes of non-insulated cars, when bent inwardly in excess of 8 in. by 8 in., or equivalent area, or when bent inwardly in excess of ¼ in. in depth regardless of area; *however, dents in heads due to present or former head-block anchorage, will be owner's responsibility.*

RULE 5

The committee recommends that the extended time limits of second paragraph of this rule, as shown in the 1936 Code, be continued until January 1, 1938, because the curtailment in car repairs results in holding of bad-order cars under present conditions.

RULE 17

The committee recommends that the "remarks" column reference to items 26, 28 and 30 appearing in the Knuckle Table in Paragraph (2) of Section (c) of this rule be modified in the

next supplement to make clear that no charge is to be made for the knuckles in these items if applied to Type E couplers and that, if the knuckles removed as specified in these items are in good condition, secondhand credit must be allowed.

The committee recommends that a new section (j) be added to this rule, effective August 1, 1936, as follows:

Proposed Form—(j) *In the application of brake-beam hangers, a difference in length of 3/8 in. (plus or minus) from that standard to car, will be considered as proper repairs.*

RULE 18

The committee recommends the addition of a new last paragraph to this rule, with new Fig. D, as follows:

In the application of secondhand couplers complete, or secondhand coupler bodies, the shank shall not be less than 21 in. in length from striking horn to crest of worn surface of butt, nor less than 3 7/8 in. from pulling (rear) surface of horizontal key slot to crest of worn surface of butt, established with parallel straight edges; otherwise, such body shall be charged at scrap value. (See Fig. D following). Coupler bodies having such minimum dimensions shall not be removed from cars for these defects alone, but if removed for other reasons and are otherwise in serviceable condition same shall be credited at secondhand value, with no allowance for expense of reclamation.

RULE 19

The committee recommends that ninth item listed under this rule, covering material that must not be used in making repairs to foreign cars, be modified in the next supplement as follows:

Proposed Form—Plain cast-iron brake shoes must not be used. New reinforced-back brake shoes must be used to justify bill. *Effective January 1, 1937 new reinforced-back brake shoes meeting requirements of A.A.R. Specification adopted in 1935 must be used to justify bill.*

RULE 20

The committee recommends that second paragraph of this rule be modified as follows:

Proposed Form—When construction of car and trucks precludes the common methods of adjusting coupler heights, the application of metal shims between journal boxes and arch bars or truck sides, *or the riveting or welding of metal shim to coupler carrier iron, is permissible.*

RULE 45

The committee recommends that this rule be modified so that instead of applying to center sills bent between bolsters, it will apply to *one or both metal center sills broken between bolsters* as well as to *one or both center sills* bent between bolsters; and to make it clear that handling-line responsibility applies to bent sills only if subsequently broken under the provisions of Rule 32.

RULE 49

The committee recommends that last sentence of Paragraph (a) of this rule be modified and included in the next supplement, as follows:

Proposed Form—Where receptacle is used, same should be in accordance with A.A.R. Recommended Practice specification, applied one per car, preferably located as follows, *or at other location conveniently accessible,* but in no case more than 5 ft. 6 in. from top of rail.

RULE 62

The committee recommends that second paragraph of this rule be modified in the next supplement, as follows:

Proposed Form—No charge shall be made for application of separate common nuts unless such nuts are fully tightened, and, where applied to journal-box bolts, column bolts or brake-hanger bolts, such common nuts must be secured with nut lock or lock nut.

Note—It will be understood that the above provision also applies when such bolts are renewed.

RULE 66

The committee recommends that Section (g) of this rule be modified to show that the conditions of the section apply when repacking is due to change of *one or more pair of wheels in each truck,* because present wording is being misconstrued to mean that all wheels must be changed to justify the one-half-hour labor charge.

RULE 70

The committee recommends that Section (c) of this rule be modified, effective August 1, 1936, as follows:

Proposed Form—(c) A.A.R. double-plate shall not be substituted for A.A.R. single-plate cast-iron wheels. *For the purpose of this rule a single-plate wheel and a double-plate wheel mounted on same axle shall be considered as a pair of double-plate wheels, and charged and credited accordingly.* Defect card is not required for such improper substitution of wheels. (See Rule 98, Section (c-5), for charges and credits).

This change is to discourage the substitution of such mixed wheels in place of single-plate wheels, in repairs to foreign cars.

RULE 87

The committee recommends that the extended time limit of first paragraph of this rule, as shown in the 1936 Code, be continued to January 1, 1938.

RULE 91

The committee recommends that the second paragraph of Section (b) and the last sentence of Section (c) be modified to permit 60 days within which countercharge authority may be issued, for the reason that the rule should give as much time to answer exceptions as it does to take exceptions to a bill.

RULE 92

The committee recommends that a new last paragraph be added to this rule, to read as follows:

In the case of leased cars, upon request by owner, such cars shall be grouped by initials and consolidated in same monthly bill with cars bearing owner's name or initials. However, separate statement and totals for each such group need not be furnished.

There is no objection to rendering bill in this manner, if so requested by car owner. However, separate statements and totals constitute additional work which should not reasonably be imposed upon repairing line.

RULE 94

The committee recommends that the extended time limits of first paragraph of this rule, as shown in the 1936 Code, be continued until January 1, 1938.

RULE 98

The committee recommends that a new note be added following Section (g) of this rule, to read as follows:

Note—In the predetermination of service metal on wrought-steel wheels by use of the standard wrought-steel wheel gage, when neither wheel is scrap, the amount of metal required to be turned off the wheel suffering the greater amount of loss, should apply equally to the mate wheel.

RULE 104

The committee recommends that Section (a) of this rule be modified as follows:

Proposed Form—(a). Secondhand A.A.R. Type D, Type E, swivel shank couplers and couplers having radial butt, or parts of same, shall be charged and credited at 75 per cent of value new. Credit shall be allowed for all parts of such couplers. *Secondhand cast-steel coupler yokes of 24 5/8-in. pocket spacing and secondhand two key forged coupler yokes, when both types are designed for 1½-in. by 6-in. horizontal cross keys, shall be charged and credited at 75 per cent of value new.*

The committee recommends that the following items be added to Section (1) of this rule, to be charged at 50 per cent of gross value new, less credit for part removed, when applied, secondhand, in repairs to owner's defects or on authority of defect card:

Air-brake parts as follows:

Auxiliary reservoir, detachable type (Nos. 2445, 24446), per Item 8, Rule 101.

Auxiliary reservoir, combined type (Nos. 2439, 21838), per Item 9, Rule 101.

Cylinder body, detachable or combined type (Nos. 67928, 68462), per Item 19, Rule 101.

Cylinder, complete, detachable type (with cylinder piston packing), Nos. 69817, 69751, per Item 19-B, Rule 101.

Cylinder and reservoir, complete, combined type (with cylinder piston packing), Nos. 69816, 69818, per Item 19-C, Rule 101.

Triple valve body, complete, old style, W. A. B., per Item 52, Rule 101.

Triple valve body, K1 and K2 types, per Item 54, Rule 101.

Triple valve, complete, convertible type, per Item 56, Rule 101.

Triple valve, complete K1 or K2 Standard, per Item 57, Rule 101.

Coupler yokes, except as provided in Section (a).

Draft arms.

Draft lugs.

Draft springs, other than those used in connection with friction draft gears.

Metal roofing, including caps.

Truck-spring caps, pressed steel. (This includes bottom caps, often designated as truck-spring seats.)

Passenger-Car Rules

RULE 4

The committee recommends that the effective date of second paragraph of this rule, with reference to equipping all steel or steel underframe cars with cardboards or suitable receptacle for the accommodation of defect and joint evidence cards, now set at January 1, 1937, be extended to January 1, 1938.

RULE 7

The committee recommends that a new Paragraph (3) be added to Section (h) of this rule, to read as follows:

(h) (3) In the application of secondhand couplers complete, or secondhand coupler bodies, the shank shall not be less than 21 in. in length from striking horn to crest of worn surface of butt, nor less than 3⅞ in. from pulling (rear) surface of horizontal key slot to crest of worn surface of butt, established with parallel straight edges; otherwise, such body shall be charged at scrap value. (See Fig. D of Freight Rule 18.) Coupler bodies having such minimum dimensions shall not be removed from cars for these defects alone, but if removed for other reasons and are otherwise in serviceable condition same shall be credited at secondhand value, with no allowance for expense of reclamation.

The committee recommends the addition of a new Section (m) to this rule, to read as follows:

(m) Refrigerator cars, designed and constructed for passenger-train service, must be reweighed and restenciled only by owners or their authorized representatives.

RULE 8

The committee recommends that a new Item 16 be added to Section (a) of this rule covering delivering line defects, to read as follows:

(16) Failure to uncouple steam hose or metallic steam connectors when uncoupling cars.

RULE 9

The committee recommends that Section (e) of this rule be modified by substituting for the words *cleaning and steaming when performed periodically* the words *periodic sanitary cleaning.*

RULE 21

The committee recommends that Item (17) of this rule be modified by substituting for the words *cleaning and steaming* the words *periodic sanitary cleaning.*

The report was signed by: W. H. Flynn (chairman), general superintendent motive power and rolling stock, N.Y.C.; C. T. Ripley (vice-chairman), chief mechanical engineer, A.T.&S.F.; T. W. Demarest, general superintendent motive power, Penna.; T. Beaghen, Jr., superintendent car maintenance, Mexican Petroleum Corporation; J. J. Hennessey, assistant superintendent car department, C.M.St.P.&P.; L. Richardson, mechanical assistant to vice-president and general manager, B.&M.; G. E. McCoy, assistant general superintendent car equipment, Can. Natl.; M. F. Covert, general superintendent of equipment, refrigerator car division, General American Tank Car Corporation.

In the presentation of this report the committee proposed certain supplementary recommendations to Rules 3 and 36, covering the use of advertising on refrigerator cars and the use of the shipper's name and location on commodity and unloading cards, the latter being beneficial and permissible. The committee said, however, that the use of printing on red background should be confined exclusively to cards used in connection with explosive and other dangerous articles as required by the Interstate Commerce Commission regulations.

Action.—The report was adopted.

Economies in Cost of Billing for Foreign Freight-Car Repairs*

As instructed, your committee has made investigation of the cost of billing for foreign freight-car repairs, has considered the economies of handling this billing through a central clearing bureau, or regional clearing bureaus, as well as the matter of discontinuing billing for foreign freight-car repairs between railroads and discontinuing such billing entirely for all foreign freight-car repairs.

Central or Regional Clearing Bureaus

The survey made on the performance of December, 1932, indicated that the establishment of a central billing bureau would bring about immediate economies amounting to approximately $15,000 per year, and that these economies would eventually be increased to approximately $60,000 per year.

The survey made on the performance of December, 1934, indicates that the establishment of a central billing bureau at the present time would show a payroll loss at first of approximately $46,000 and that eventually this loss would be converted into a saving of $3,000 per year.

This difference is brought about by decreased costs reported in handling the billing, due to increased efficiency, improved methods and economies effected since the promulgation of the 1932 report and the adoption of recommendations contained therein.

The cost of preparing outgoing bills for December, 1934, fluctuated from $16.96 to $111.64 per $1,000 billed, the general weighted average being $30.77; and costs of checking and handling incoming bills varied from $4.51 to $35.07 per $1,000 paid, the general weighted average being $11.23. The committee feels it is probable that further economies could be effected by roads showing a high cost of billing.

From the foregoing it will be obvious that there is no economy in the establishment of a central billing bureau. On the other hand, such an organization would have some distinct disadvantages:

1—Car owner would have no means of:

(a) Locating responsibility for wrong repairs made to his equipment.
(b) Detecting roads making a practice of specializing in certain items of repairs, which may be done only by analysis of bills.
(c) Checking for guaranteed wheels and other guaranteed parts removed from his equipment on foreign lines.
(d) Checking items of repairs for so-called duplicate and time limit charges, such as renewal of journal bearings, periodic repacking of journal boxes, cleaning of air brakes, renewal of wheels and relightweighing of equipment.
(e) Checking car repair bills with the correspondence in cases of cars reported to owner for disposition under Rule 120 (owner's defects), extensively damaged cars sent home on defect cards, wreck truck applications, fire damage insurance reports or claims, and material ordered from car owner under Rule 122. All these features are directly associated with car repair billing.
(f) Checking, investigating and controlling practices at own shops through studies of accumulated billing repair cards, covering extent and character of repairs made to foreign cars and, also, the studying of charges rendered where complaints from car owners may be received as to cost of repairs billed per car day, or per one thousand miles operated.
(g) Checking cost of maintenance and/or failures of certain devices on system cars, such as certain types of roofs, doors, coupler attachments, draft gears, auto loading devices, wheels, etc.

2—The impracticability of the central billing bureau checking accident reports of individual railroads for the purpose of preventing unfair usage items being billed against car owner.

Elimination of All Billing for Freight-Car Repairs

The committee has considered a deduction from the per diem and mileage rate allowances, in order to eliminate all billing. This would effect a saving of $619,680 per year. Dividing this amount among the 2,500,000 freight cars owned by railroads and private lines, the average cost of billing would be approximately 25 cents per car per year.

Offsetting the above expense, elimination of billing for repairs to foreign freight cars would have the following distinct disadvantages:

1—Although car users would, to compensate for expense of repairs to foreign cars, retain a portion of the per diem and mileage allowances therefor, unless a method were devised to check expenditures of individual roads, the urge of the user to conserve as much as possible of the said allowances would undoubtedly lead to his neglecting to perform his fair share of foreign freight-car maintenance to the detriment of such equipment.

2—This neglect of repairs to foreign cars would first become apparent at interchange points and result in a general tightening up of inspection. That, in turn, would retard the movement of cars in interchange, and to properly protect receiving lines against the delivery of under-maintained cars, it would, without question, be necessary to substantially increase the force of inspectors at interchange points.

3—The same urge by car owners (including private car lines) to neglect repairs to their own cars about to be delivered in interchange, would assert itself.

4—This incentive to neglect repairs to loaded cars would increase transfers, switching expense, detention enroute and consequent damage claims.

5—Car owners would have no means of checking responsibility for failure of repairing line to maintain owner's standards and A. A. R. requirements.

6—The use of inferior material in repairing foreign cars, would result in more frequent shopping of cars, increased maintenance, failure of cars enroute and, consequently, increase in train detentions.

7—Switching and terminal lines which do not participate in per diem or the mileage rates would have no means of clearing their car repair expense.

8—Difficulty in arranging settlement for destroyed cars, or

* This is a summary of the September, 1935, report of the sub-committee referred to as Exhibit B of the report of the Arbitration Committee.

for extensively damaged cars which handling line may desire to return to owner on account of not having proper material or facilities to make repairs, or for other reasons.

9—Study was made of one member road during the month of March, 1935, as to cost of repairs per car, per day, spent on foreign cars of fifty different ownerships. Likewise, the cost per car, per day, spent on same fifty railroads to this member's cars while on their lines. Also, the amount expended by the same member railroad per car, per mile, on repairs to cars belonging to thirty private lines. The cost of repairs to the cars of the fifty different ownerships ranged from $.3536 to $.0379 per car, per day. In the case of the thirty private lines, from $.00623 to $.00078 per car, per mile. Conversely, the cost of repairs to this member's cars on the fifty foreign lines, ranged from $1.375 to $.0314 per car, per day. These are wide variations and it must be obvious that unless there were inaugurated and made effective, some system whereby each individual railroad would be obliged to assume its fair proportion of foreign car repairs, the retention of an allowance from the per diem and mileage rates for this purpose would react to the benefit of some roads and to the detriment of others. In other words, such an arrangement would be grossly inequitable.

In order to take care of the disadvantages enumerated above, it would be necessary to provide new or revised methods and rules to govern the condition of and repairs to freight cars for the interchange of traffic, involving additional expense, in the treatment of which three important considerations were kept in mind: First, the interchange of cars must be in accordance with the safety appliance law. Second, the elimination of this billing must in no way affect the physical condition of cars interchanged from a safety standpoint. Third, the movement of cars in interchange must not be slowed up.

Summary of Additional Expenses

Summarizing the estimates to remedy, as far as practicable, the nine major disadvantages listed, we have the following additional expenses:

Disadvantages 1, 2, 3, 8 and 9	$565,553.60 per year
Disadvantage 4—	
Transferring loads (minimum) $1,250,000.00	
Loss and damage (minimum) 100,000.00	
	1,350,000.00 per year
Disadvantage 5—No estimate.	
Disadvantage 6—No estimate.	
Disadvantage 7—Clerical force for switching and terminal lines	21,707.00 per year
	$1,937,260.60 per year

It is probable that the additional expenses due to Disadvantages 5 and 6 would increase the above total to at least $2,000,000 per year. The committee feels that these estimates of additional expenditures which the elimination of billing would necessitate, are conservative.

According to the survey made of the December, 1934, performance, 33.9 per cent of the total bills rendered was for private line accounts ($2,119,748.66 total, $718,748.18 for bills against private cars). 33.9 per cent of $36,339, which is the total saving per month for bills rendered if all billing were eliminated, is $12,318.92. Also with reference to incoming bills: 2.79 per cent of the total bills received was for private line accounts ($1,551,242.49 total, $43,299.34 for bills against private cars). 2.79 per cent of $13,233.65, which is the total saving per month for bills received if all billing were eliminated, is $369.22. Then $12,318.92 plus $369.22 equals $12,688.14, the total amount of saving by billing elimination, attributable to private cars, on the theory that the cost of billing as between privately owned cars and railroad owned cars is directly proportional to the amount of the bills.

As this calculation is based upon 96 per cent of the car ownership, 100 per cent would be $12,688.14 times $\frac{100}{96}$ equals $13,216.81 per month or $158,601.72 per year.

Then $619,680.00 (total savings per year by all billing elimination) minus $158,601.72, equals $461,078.28 the savings per year if billing for railroad owned cars only were eliminated. This is 74.4 per cent of the total of $619,680. On the assumption that the cost of the major disadvantages, $2,000,000 per annum, are apportioned on this same basis, then if billing between railroads only were eliminated, these major disadvantages would cost 74.4 per cent of $2,000,000 or $1,488,000 to produce the saving of $461,078.28.

Conclusions and Recommendations

In view of the fact that but $461,078.28 per year would be saved by eliminating billing between railroads, as compared with the minimum additional expense of $1,488,000 per year which would be necessary, and, furthermore, that but $619,680 per year would be saved by all billing elimination, as compared with the minimum annual additional expense of $2,000,000, it is the recommendation of your committee that billing for foreign freight-car repairs be continued.

The members of the Subcommittee on Economies in Connection with Cost of Billing for Foreign Freight Car Repairs, which prepared this report are: W. R. McMunn, chairman; J. E. O'Brien; J. E. Mehan; C. J. Hayes and T. J. Boring.

Prices for Labor and Materials

In order that the rules may currently provide an equitable basis for inter-road billing, the committee has continued the work of analyzing material, labor and new equipment costs in A.A.R. Interchange Rules 101, 107, 111 and 112 of the Freight Car Code, and Rules 21 and 22 of the Passenger Car Code, with a view of determining and recommending necessary changes to be made in the next supplement to the current Code.

Rule 101

All miscellaneous material prices in Rule 101 were rechecked as of March 1, 1936, quotations from purchasing agents of the 10 selected railroads, representing 39 per cent of total freight car ownership in the United States and Canada, indicating little change in material markets as shown by detail recommendations for revision under this rule. A slight increase in prices for bolts, nuts, forgings, castings, journal bearings, cast-iron wheels and axles is recommended, while a slight decrease is shown in prices for chain, nails, approved types of draft gears and larger sizes of pipe.

New Items 69 to 76 inclusive are added, to provide charge for extra heavy pipe fittings. New Item 121-B is added, to provide charge for "E" type 6¼-in. by 8-in. swivel-shank coupler (excluding swivel butt casting and pin). New Items 179 and 179-A are added, to provide prices for ¾-in. pipe.

First note following heading "Friction Draft Gears" on page 173 is modified to establish equitable credit in cases where approved type gears are substituted as correct repairs for non-approved types, in order that such substitution may not be penalized. Three additional types of non-approved draft gears are added to Section II of the table.

Rule 107

A new note is added to Item 21, to provide additional charge for raising and blocking truck and spring plank to apply rivets securing brake beam supports, when work is performed by this method.

Third note following Item 31, and Item 43, are modified to clarify the intent that the operations in question apply in connection with coupler stop casting rivets as well as bolts.

Third note following Item 270 is modified to make clear that charge for turning wheels may be made for defects which require turning, such as thermal cracks, etc., instead of being confined only to wheels which do not have full flange contour when removed or where fused metal has accumulated on treads.

First note following Item 281 is modified to restrict total charge for repairs by welding of those parts listed under Section (1) of Rule 104, to the second-hand allowance provided therein.

Item 295 is modified to clarify the intent with respect to charge for jacking car, when necessary in connection with work charged under this item.

Rule 111

No modifications are recommended in this rule.

Rule 112

No change in settlement prices for destroyed cars is recommended, due to the small number of cars built during 1935 and the fact that costs reported for hopper cars included a number of cars of special light weight design. Other costs reported vary but little from prices now listed in this rule.

Passenger Rule 21

A new last paragraph is added to first note following Item 26, to harmonize with third note following Item 270 of Freight Rule 107.

Passenger Rule 22

Changes in material prices in a number of items under this rule are recommended, based on quotations as of March 1 from the purchasing agents of ten representative railroads.

Item 2 is modified to cover the A.A.R. Standard and Alternate Standard passenger type brake shoes adopted by letter ballot last year.

It is the intent of the Committee to investigate labor and material costs again in October and if sufficient change develops,

necessary revision will be made and inserted in the Rules effective January 1, 1937.

The changes recommended in the existing rules were shown in detail in the report.

The report was signed by A. E. Calkins (chairman) superintendent of equipment, N. Y. C.; H. H. Harvey (vice-chairman) general car foreman, C. B. & Q.; F. J. Dodds, general car inspector, A. T. & S. F.; P. Kass, superintendent car department, C. R. I. & P.; O. A. Wallace, supervisor car repairs, A. C. L.; T. J. Boring, general foreman, M. C. B. Clearing House, Pennsylvania; J. P. Egan, superintendent car inspection and maintenance, N. Y. N. H. & H.; H. H. Boyd, assistant chief motive power and rolling stock, Can. Pac.; A. E. Smith, vice-president, Union Tank Car Co., and A. H. Gaebler, superintendent car department, General American Transportation System.

Action.—The report was adopted.

Report on Couplers and Draft Gears

Draft Gears

Approval Tests.—No additional certificates of approval have been granted during the past year. An application has been received for approval of a new type of gear, specimens of which have been obtained and are undergoing tests in the A. A. R. laboratory at Purdue University. The total number of certified gears, therefore, is still nine, as listed in the latest issue of the Code of Interchange Rules.

Other Laboratory Work.—The testing laboratory has been engaged on a wide variety of work, including periodic check tests of non-harmonic springs and special trucks for the Car Construction Committee, tests designed to establish a basis for improvement in specification requirements for draft gears, and commercial tests of draft gears and springs.

Obselete Gears.—The sub-committee is continuing to co-operate with the Committee on Prices for Labor and Materials in an effort to relegate to the obsolete class as rapidly as practicable the older and less efficient types of gears.

Standard Draft Gear.—This subject has received continued consideration. For the reasons set forth in last year's report, one standard draft gear is considered desirable but not essential, especially at this stage of development. It is probable, however, that within the next year the sub-committee will recommend adoption of requirements providing for complete physical interchangeability of approved freight car draft gears, including standardization of supports and guides for the gear.

Application of Non-Approved Gears.—It was found that one car owner was applying a non-approved type of draft gear to a lot of new cars. The secretary called the attention of the owner to Par. (1), Sec. (d) of Interchange Rule 3, which requires the application of certified gears, and the road promptly discontinued further applications and arranged to remove all the non-approved gears already applied and substitute certified gears.

Marking of Certified Gears.—A misunderstanding has arisen with respect to the proper marking of certified gears. All certificates of approval now in force have been issued under the 1931 specifications and, for this reason, most manufacturers have continued to mark their gears "A. A. R.-31," notwithstanding the fact that the present standard specifications are dated 1934. One manufacturer, however, changed the marking on his certified gear to "A. A. R.-34," when the new specifications were issued. The sub-committee has decided, inasmuch as the present specifications are dated 1934, all certified gears should be so marked. In the future, whenever changes are made in the specifications so as to require a new printing, with a corresponding change in date, the sub-committee will advise the secretary whether or not the change will necessitate any action on the part of the manufacturers of approved gears other than to change the marking. The secretary, in turn, will notify the manufacturers so that the marking at all times will agree with the latest issue of the specifications.

Revision of Specifications.—It is recommended that the present Standard Specifications for Approved Draft Gears for Freight Service, M-901-34, be revised as follows:

(a) Change Par. 11, Appendix A, to read:

"11. If a manufacturer desires to make any change in a draft gear he is marketing under a certificate of approval, he shall advise the secretary of the Mechanical Division, furnishing full information as to the nature of the proposed change and the objects expected to be accomplished thereby. This provision is intended to cover such changes as methods of assembling parts, methods of gaging parts or assemblies, methods of conditioning assembled gears, changes in metallurgy or physical characteristics of parts, and changes in design of parts, regardless of whether the adoption of these changes would result in changes in the drawings or specifications covering the parts or assemblies. If a new issue of a drawing or specification is made for the purpose of clarifying or correcting it, notice shall also be given to the secretary. The Draft Gear Committee will decide in each case what action is to be taken on these changes and, in the event they are approved, will arrange to have the records accompanying the certificate of approval changed so that these will be up-to-date at all times."

The purpose of this change is to clarify the present wording, which apparently has been misunderstood by some manufacturers.

(b) Change Par. 13, Appendix A, to read:

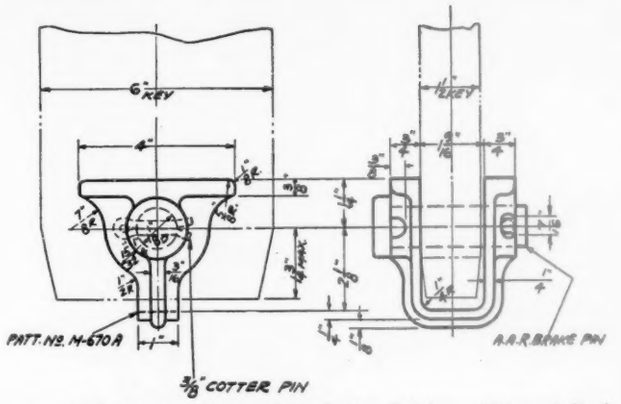
"13. On or before January 5th of each year the secretary of the Mechanical Division will canvass the manufacturers of approved draft gears to determine whether the record drawings and specifications of each approved draft gear are up-to-date. For the benefit of members of the Association of American Railroads a separate list of approved gears will be shown in the Interchange Rules."

Adoption of this change will place the regulations in line with what experience has shown to be the best method of handling these details. For convenience in making the yearly canvass, a form of questionnaire will be prepared for submission to each manufacturer.

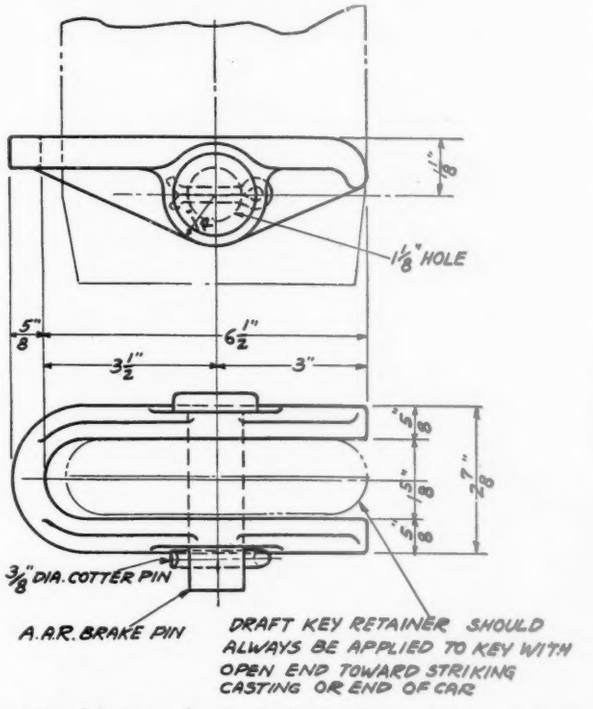
(c) Add new Par. 16, to Appendix A, to read:

"16. When a certificate of approval is issued for a draft gear for which the committee does not have any previous record of service performance, this certificate shall be conditional until the service performance of the gear shall have been investigated. In order to facilitate this investigation, the manufacturers shall notify the secretary of the Mechanical Division of all sales of the gear during the period while the certificate is conditional. The Draft Gear Committee will arrange to supervise the original installation of a limited number of these gears and, after the expiration of a two-year service period, their condition will be checked in order to determine whether the conditional restrictions on the certificate may be removed."

Adoption of paragraph is recommended in order to make a distinction between gears known to give satisfactory performance and gears of an entirely new type which have no service record. Indications are that there will be no more applications for approval of service-tried gears, but that there will be applications for approval of new types of gears.



Permissible Substitute—Universal Draft Key Retainer—Universal Draft Gear Attachment Company


1 1/8" HOLE
5/8"
6 1/2"
3 1/2"
3"
7"
3/8" DIA. COTTER PIN
A.A.R. BRAKE PIN
DRAFT KEY RETAINER SHOULD ALWAYS BE APPLIED TO KEY WITH OPEN END TOWARD STRIKING CASTING OR END OF CAR

Permissible Substitute—Surelox Draft Key Retainer—Western Railway Equipment Company

The sub-committee report on draft gears was signed by H. W. Faus, chairman; H. W. Coddington, H. I. Garcelon, L. H. Schlatter and W. Bohnstengel.

Type E Couplers

Methods Followed in Maintaining Quality and Interchangeability.—The Type E coupler has been in service long enough to obtain some service experience with it. In this connection it should be of interest to describe briefly the methods followed in order to maintain uniform high quality and strict interchangeability. The Mechanical Committee of the Coupler Manufacturers arranges with each manufacturer, two or three times each year, to submit for checking a complete coupler representing the current average production.

Each group of representative couplers submitted is inspected and gaged. This is followed by an interchange of knuckles, where each manufacturer's knuckle is applied and operated in all couplers. Next follows a miscellaneous interchange of parts with no two parts of the same manufacture in any one bar. Results are tabulated, analyzed by each manufacturer and any adjustments made which may seem necessary. Each group of couplers is then subjected to a physical test, usually a static tensile or a dynamic compression (strike) test.

This practice of periodic inspection and testing was instituted soon after the Type D coupler was adopted in 1916, and has been continued ever since.

Since adoption of the Type E coupler in 1931, five groups of representative couplers have been submitted. Four groups were subjected to static tensile tests and one to a dynamic compression (strike) test. In one of the tensile test groups the couplers were provided with alternate standard swivel shanks and included representative swivel yokes. The couplers in all other groups were provided with standard rigid shanks.

[Tables giving test results which were included in the report have been omitted.—EDITOR.]

Top-Lock-Lifter Hole Caps—Application.—Some roads have reported that the cap used to close the top-lock-lifter hole in Type E bottom-operated couplers did not effectively close this opening. Investigation developed this to be due to a failure to apply the cap in the proper manner. The cap has a convex surface which must be flattened down with a hammer in order to spread the inside nibs against the side of the lock lifter hole. If this practice is observed there should be no occasion for complaint about the caps not effectively closing the opening.

Bottom Rotary Lever.—In the operation of some earlier Type E bottom-operated couplers the rotary lever would, in the process of rotating, cant in such a manner as to reproduce abnormal friction between the lever and the surface upon or against which it rotates. This has been corrected and a new design presented for approval. This improvement has been approved by the Coupler Committee and bottom-operated Type E couplers now produced have this new rotary lever.

Inspection and Maintenance of Draft Gears

In 1934, the committee presented a recommended practice for inspection and maintenance of draft gears and attachments. These recommendations were adopted and a number of roads have been conforming to this method which has resulted in a marked improvement in reducing free slack. The process on some other lines has not been followed so closely and the committee is urgently stressing the importance of all roads complying with this method of reducing unresisted slack. It has been suggested that observance of this recommended practice be made mandatory and at the same time provide for the attention being given on other than owned cars and setting up of interchange price for the operation. The committee is hoping to avoid such an alternative and, therefore, is urging the membership to institute the practice of reducing unresisted slack in draft gears and attachments as shown on page 141, Sec. L of the Manual.

Type D Coupler Bodies—Discontinuing Use

In 1935 attention was directed to the action taken by the Association authorizing manufacturers to dispose of patterns, core boxes, etc., of Type D coupler bodies.

In order to protect in interchange the interest of roads using the standard E coupler, the committee recommended that the Arbitration Committee revise Rule 101 so that after January 1, 1936, a new Type D coupler body can only be applied to a foreign car at second-hand value. This rule has been effective since the first of the year, but the record of sales indicate that it has not had any retarding influence upon the demand and production of Type D couplers in some territories. It is, therefore, recommended that Interchange Rule 3 be revised to read as follows:

"(c-10) Coupler, Type D, cast after August 1, 1936, prohibited, effective January 1, 1937, on all cars. In interchange."

Reclamation of Swivel-Shank Couplers

Consideration has been given to methods to be recommended in the reclamation of swivel-shank couplers to compensate for wear between buffing surfaces. This study has involved the inspection of a large number of swivel-shank couplers removed from service. A limited number of swivel-butt castings and swivel pins have also been inspected, but no vertical-plane yokes were available for this study. Consideration has also been given to inspections made of swivel-shank couplers, swivel-butt castings, vertical-plane swivel yokes and swivel pins still in service. As a result the committee recommends that the following practices be observed in the reclamation of swivel-shank couplers:

1. A. A. R. Standard E and Type-D couplers having swivel shanks be subject to reclamation when the free slack in the swivel joint has increased to 3/8 in.

2. Reclamation of swivel-shank couplers as covered in Item 1 be accomplished by building up, by electric or acetylene welding, the ends of the shank loops and the top and bottom front buffing shoulders of the shank an amount equal to a new coupler maximum size. One illustration shows the locations where this building up process is recommended, and the other illustration the general design and important gaging dimensions of a suitable gage recommended for this reclamation purpose.

3. Coupler bodies that have been reclaimed in accordance with Item 2 must be re-annealed before being returned to service.

4. The difficulty of satisfactorily performing any reclamation operations on swivel pins, swivel-butt castings and swivel yokes, so far as the swiveling feature is concerned, indicates that it will be better to replace these items with new parts when too badly worn for further service.

[NOTE—Illustrations referred to are omitted.—EDITOR]

This subject is to be given further consideration with the idea of keeping abreast of developments that might affect the reclamation practices above recommended.

Tight-Lock Couplers

Considerable interest has been expressed by roads anticipating modern passenger car construction with reference to tight-lock couplers. The coupler manufacturers have been doing some individual development along this line and your committee has requested them to give this subject their joint consideration toward finally recommending a reduced-contour-clearance coupler or a tight-lock coupler embodying those features of design that may be necessary to provide the simplest and best arrangement of one such coupler development. A sub-committee is working with the manufacturers in connection with the development of the tight-lock coupler and it is anticipated that a design that will meet requirements will soon be presented.

Draft Key Retainer—A. A. R. Standard Approved Equivalent

Interchange Rule 3—Item 3, reads as follows:

"(3) Draft Key Retainer, A. A. R. Standard, or approved equivalent, or A. A. R. Alternate Standard one-inch diameter hair-pin type, required on all cars (equipped with horizontal draft keys) built new or rebuilt on or after March 1, 1929. Effective January 1, 1937, the foregoing requirement will also apply to all cars built prior to March 1, 1929. From owners."

Your committee has been asked to emphasize the importance of providing proper draft key retainers on account of several serious accidents having occurred due to couplers pulling out after losing the draft key as a result of non-standard draft key retaining devices. There are two types of standard draft key retaining devices shown in the Manual. The T-pin type is shown on Plate C-28-B, and 1-in. hair pin type on Plate C-28-C.

There are three devices recognized as permissible substitutes for the two standard retainers. Two of these are shown.

With these various inexpensive devices available for application, and as a safeguard against accidents that have occurred where standard devices were not used, your committee recommends that the date for all cars offered in interchange to be so equipped be not extended beyond the present published date of January 1, 1937.

The report was signed by R. L. Kleine (chairman), assistant chief motive power, Penna.; H. W. Coddington (vice-chairman), engineer of tests, N. & W.; C. P. Van Gundy, engineer of tests, B. & O.; C. J. Scudder, superintendent motive power and equipment, D., L. & W.; Samuel Lynn, superintendent rolling stock, P. & L. E.; L. P. Michael, chief mechanical engineer, C. & N. W.; C. T. Ripley, chief mechanical engineer, A. T. & S. F.

In presenting the section of the report on couplers, the committee added a recommendation for the modification of the top lock lifter on the Type D couplers to extend the anti-creep shoulder and suggested that the modified lifter be known as the Number 3 type. It further recommended that the Number 2 lifters have the anti-creep shoulder extended by application of welding, so that it may conform to the Number 3. This is to overcome the uncoupling in service, presumably due to the anti-creep feature of the top lock lifter not preventing the upward creeping of the lock. Sketches of the lock lifters and gages suitable for governing these changes in them will be included in the supplement attached to the letter ballot on the report.

Action.—The report was accepted and the recommendations referred to letter ballot.

Motor Transport Section

Inter-City Trucking Proves Efficient

Missouri Pacific establishes a number of cross-country routes to provide more flexible service for branch line towns

FOR approximately five years, the Missouri Pacific has been making intensive studies of its l.c.l. freight transportation in Kansas, Missouri and Nebraska. As a result, many inter-city truck routes have been established and are now in operation on a profitable and efficient basis in this territory, and the operations are being extended wherever conditions make this the most convenient and economical mode of transportation.

The Missouri Pacific truck operations cover a wide variety of uses. One of the unusual features is that, in many cases, towns on two and sometimes three paralleling branch or main lines are connected by a truck line that operates across country, thus eliminating the handling of merchandise through several junctions and avoiding a backhaul in a number of instances. The extent to which this is done is indicated on the accompanying map.

To determine the advisability of truck operation, traffic and operating officers made joint studies and recommendations which were passed on to the district officers and thence to the assistant general manager and assistant chief traffic officer for final approval. These studies were made for the purpose of developing whether the inauguration of truck service would result in any economy or improvements in service or both. In some cases truck service made it possible to eliminate certain local trains. In other cases, it developed that the delivery of merchandise freight could be speeded up from 24 to 48 hr. by the use of trucks.

Following are the truck routes which have been established thus far to expedite the handling of merchandise and to provide a greater flexibility of service:

Salina, Kan., to Concordia—122 miles per round trip. This is a cross-country operation, from one east-west line of the railroad to another. It does not parallel the railroad, and no intermediate stations are served.

Topeka, Kan., to Atchison—126 miles per round trip. This is also a cross-country operation, similar to the Salina-Concordia route, and no intermediate stations are served.

Atchison, Kan., to St. Joseph—50 miles per round trip. St. Joseph is on a branch line of the Missouri Pacific, across the Missouri river from the Omaha-Kansas City main line of the M. P., on which Atchison is situated. This route serves no intermediate stations, handling Atchison and St. Joseph merchandise only.

Kansas City, Mo., to Leavenworth, Kan., and Atchison—115 miles per round trip. Two round trips are made on this run daily except Sunday. The route parallels the main Kansas City-Omaha line of the M. P., and Leavenworth, Kan., is the only intermediate station served.

Three Branches Connected

El Dorado, Kan., to Winfield and Arkansas City—136 miles per round trip. This is a cross-country run that connects three stations on three separate branch lines, and does not serve any intermediate stations.

Concordia, Kan., and Burr Oak—104 miles per round trip. This route parallels a branch of the M. P. for

Cross-Country Services Speed Missouri Pacific Merchandise Traffic

some distance and then follows another branch to its terminus, serving four intermediate stations enroute. A round trip is operated daily except Sunday, and the truck handles mail, baggage and express as well as l.c.l. freight. Freight trains are operated on the Burr Oak branch for carload traffic only.

Downs, Kan., to Lenora, and Downs to Stockton. Lenora and Stockton are situated at the ends of two separate branches out of Downs, and there are intermediate stations to be served on both branches. A freight train operates between Downs and Lenora on Monday, Wednesday and Friday, and between Downs and Stockton on Tuesday, Thursday and Saturday. The truck operates between Downs and Lenora on Tuesday, Thursday and Saturday and between Downs and Stockton on Monday, Wednesday and Friday. Thus both branches are provided with service for l.c.l. traffic every day, and for carload traffic every other day.

Extra Service Provided

Osawatomie, Kan., to Coffeyville — 373 miles per round trip. This route was established to provide Coffeyville and Independence wholesalers with twice-a-day merchandise service. The truck is scheduled to deliver merchandise from the East to receivers in the important centers of Independence, Kan., and Coffeyville in the early morning. It leaves these cities in the afternoon and distributes merchandise from their jobbers as far as Yates Center, giving same afternoon delivery. Merchandise turned over to the railroad after the departure of the truck is handled by train and given first morning delivery to the same points.

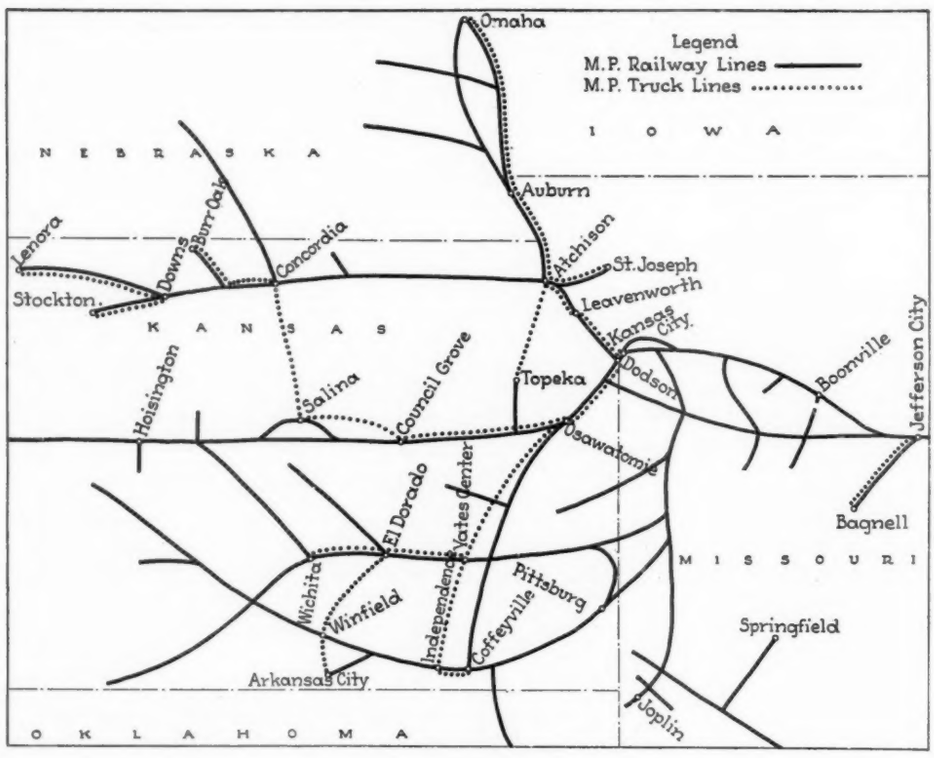
Atchison, Kan., to Omaha, Neb.—373 miles per round trip. This route serves stations along the river line of the M. P., particularly north of Auburn, from which point the M. P. has two lines into Omaha.

Osawatomie, Kan., to Salina—354 miles per round trip. This route parallels the main line for the entire distance, serving all the intermediate points, and relieves a local freight train between Council Grove and Salina and a local formerly operated on alternate days between Osawatomie and Council Grove. When the schedules of through passenger trains Nos. 13 and 14 were accelerated, this truck also began handling mail, baggage and express in addition to merchandise, and several stops formerly made by these trains were eliminated.

Wichita, Kan., to Yates Center—210 miles per round trip. This route parallels the main line into Wichita and is run to give Wichita wholesalers the benefit of twice-a-day service, similar to the arrangement at Coffeyville previously mentioned. It gives a more flexible service, also, to all the intermediate stations enroute.

Except as otherwise specified, all of these routes are operated with one round trip daily except Sunday.

Still another truck operation is the one between Osawatomie, Kan., and Dodson, Mo., 150 miles per round trip. This service is used only on days when freight shipments show up at Osawatomie for points between Osawatomie and Dodson. Seven intermediate stations are served. The contractor makes trips as directed by the railroad superintendent and is paid for actual mileage made. For example, if a trip is made from Osawatomie to Paola, round-trip distance of 16 miles, payment is made on the basis of 16 miles.



The Missouri Pacific Trucking Operations Cover Three States

These truck routes are operated under contract on a mileage basis with the Blake Transport Company, Kansas City, Mo. This company has a permit to operate as a truck carrier of interstate and intrastate business in Nebraska and Kansas, while in Missouri its permit was issued as a common carrier of interstate business. All freight handled by the transport company is carried through to destination on railroad billings. The transport company merely loads the freight on the truck, gives a receipt to the agent of the Missouri Pacific, then transports the freight to the designated station, at which point it is delivered to the Missouri Pacific agent, who in turn gives a receipt for it to the driver of the truck. The transport company now operates approximately 20 trucks which are used exclusively in handling Missouri Pacific freight, and a great number of others that are

used for part-time operations as the business demands.

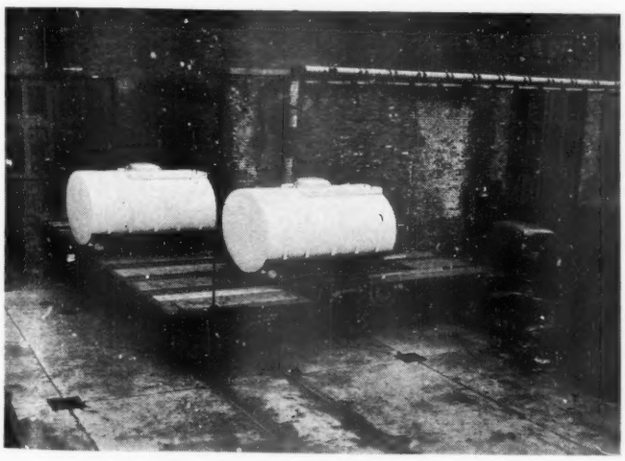
The Missouri Pacific also operates a truck route under its own certificate between Jefferson City, Mo., and Bagnell, 134 miles per round trip. This truck operates daily except Sunday along this branch line, handling mail, baggage, express and merchandise, and the more flexible service has resulted in increased business along this route.

While the economies resulting from the elimination of local freight trains have been satisfactory, the improved merchandise service provided has also resulted in the Missouri Pacific regaining traffic which was formerly moving via the lines of highway competitors. An unlooked-for development which has taken place is that the improved l.c.l. service has resulted, in many cases, in additional carload business being routed via the Missouri Pacific.

These operations have been successful enough to justify continued studies along the same lines and to induce the Missouri Pacific to extend this inter-city truck service from time to time as operating efficiency and better service demand.

New Co-ordinating Equipment for Handling Milk Containers

CONTAINERS for milk, with equipment for transferring them from highway trailer to flat car and flat car to trailer, have been developed by the Motor Terminals Company, New York, N. Y. The highway vehicle consists of a tractor and semi-trailer, having-capac-



Container Being Moved from Car to Trailer

ity of 10 tons. The trailer was built by the Trailer Company of America from plans and specifications furnished by the Motor Terminals Company. The containers consist of insulated, 2,000-gal. tanks of oval section, supported in a cradle resting on skids. The inner tank is made of 10-gage welded stainless steel. It is separated by 2½-in. of cork insulation from the outer shell, which is made of 12-gage Armco steel, also welded.

The flat car used for transporting the containers is equipped with transverse grooves or skidways, and the tractor-trailer has similar ways extending longitudinally the full length of the trailer.

Mechanism for transferring a container is mounted on the trailer. Power for its operation is obtained from

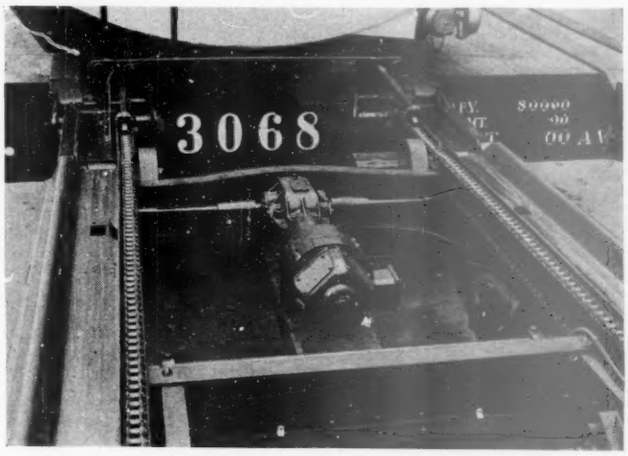
Coupling Device for Securing the Trailer to the Car During the Transfer Operation

the tractor. When a container is to be transferred, the trailer is backed against the side of the car and, when in the proper position, is secured to the car, as shown in an illustration. A pair of links are then inserted into coupling receptacles at one end of the cradle. The opposite ends of these links are clamped to a pair of chains which run over sprockets located at the front and back of the trailer.

The chains are driven through a worm drive by an electric motor, having a 3-hp. 5-min. rating. The motor receives its power from a 110-volt, 24 amp. d.c. generator, driven by a chain from the power takeoff on the tractor transmission.

A small reversing controller, located near the rear of the trailer, connects the motor and generator. Closing the circuit energizes a relay, which in turn advances the throttle on the engine sufficiently to operate the generator at full speed. A locking mechanism on the cradle skid secures the tank to the flat car by means of hook bolts. Operating the lock closes the receptacles which receive the links used for transferring.

The developer of the equipment—the Motor Terminals Company— is the parent corporation of the Cincinnati Motor Terminals Company which has since 1917 handled all terminal interchange for railroads serving Cincinnati, Ohio. Another affiliate is the Motor-Rail Company, Inc., which is engaged in intercity operations over the Pennsylvania between New York, Philadelphia, Pa., Baltimore, Md., and Washington, D. C.



Motor and Drive for Transfer Chain-Links for Coupling Container to the Chains Are Shown in Place

I.C.C. Continues C. and D. Hearings

Shippers favor service—P.R.R. shows railroads effect large economies by heavier car and truck loading

WASHINGTON, D. C.

THE growing controversy between the railroads and the trucking interests over the legality of railroad pickup and delivery service was brought to a head at the hearing begun on June 16 before Examiners Archer and Hosmer of the Interstate Commerce Commission in connection with the commission's investigation of the pick-up and delivery service of the eastern railroads. The hearing brought out such a large attendance of representatives of railroads, shippers, and truckers as to overtax the largest hearing room of the commission's new building put in service about a year ago before the commission had had the new function of regulation of motor transport added to its duties.

Legality of All R.R. Local Trucking Questioned

"These proceedings involve," Examiner Archer said, "the lawfulness of the so-called storedoor service, or the pick-up and delivery service as proposed by the rail lines operating in official territory as well as a proposed allowance to shippers for performing their own service, and also the lawfulness of the present pick-up and delivery service as now performed by certain rail lines operating in official territory. The legality of the proposed tariffs and of the tariffs at present in effect is also involved, as well as all incidental matters relating to the service."

The Pennsylvania, which with other lines initiated pick-up and delivery service in December, 1933, took the lead in offering testimony in support of its plan, the first witness being Fred Carpi, general freight agent. His statement was reported in last week's issue. Immediately following his testimony and cross-examination by counsel for the trucking interests the latter filed a formal motion asking the commission to require the railroads to furnish voluminous information designed to show that there was disagreement among the railroads on the subject, to which the railroads filed a formal reply objecting to the request. Specifically the commission was asked to call upon the railroads to produce all minutes and records of conferences or meetings of railroad committees relating to storedoor pick-up and delivery service and to the filing of tariffs providing therefor; to call for all other records or statistics, including cost and tonnage figures, considered by the several railroads jointly and individually in connection therewith, or appropriate to a full investigation of the questions; and to call for examination and cross-examination in this proceeding the officials of individual respondents familiar with the views of their respective railroads from time to time with reference thereto, and who authorized for their respective railroads the filing of the tariffs which the commission had suspended.

In their reply the railroads said among other things that the records of conferences or meetings are and should be regarded by the commission as within the rule applying to privileged communications and that the motives or reasons for the filing of tariffs can have no bearing on their legality. The commission on June 22 denied the motion.

Mr. Carpi was followed by J. R. Mac Ananny, assistant freight traffic manager of the Boston & Maine, who said that that company had had pick-up and delivery service since 1932 with added graduated charges for distances in excess of 260 miles. He opposed allowances to shippers performing the service for themselves and said that only competition would persuade his road to consider making such allowances. He said the service had been beneficial. The railroad testimony was then temporarily suspended while a number of shippers testified, most of them showing that the pick-up and delivery service was of benefit to them, although some objected to the allowance to shippers.

Much of the cross-examination by counsel for the truck interests was directed toward establishing that the service was very costly to the railroads and meant giving a greater service for the standard rates, while the railroad witnesses testified that the added expense was more than offset by economies in the handling of l. c. l. traffic which the pick-up and delivery service made possible by increasing its volume. All of this led to considerable wrangling.

The railroad testimony was resumed on June 19 with a statement by J. L. Webb, superintendent of stations and transfers of the Pennsylvania, who said that greatly improved service at lower cost to shippers and substantial increases in net revenue to the railroads will follow the introduction of complete pick-up and delivery service at station-to-station rates.

The present limited pick-up and delivery service, in effect since December 1, 1933, requires the payment of additional charges for the service when rendered beyond distances of 260 miles. The railroads are seeking to eliminate these charges in order to increase the attractiveness and broaden the use of the service.

Mr. Webb testified that the present limited storedoor operation "has definitely proven to be of public interest in providing transportation service under a single responsibility, from the door of the shipper to the door of the receiver, at a lower transportation cost; has provided an earlier delivery to receivers of freight, and later closing time for shippers, and a material reduction in transit time from shipper's door to receiver's door."

Faster Service, Simpler Packing Requirements

With the introduction of complete service proposed by eastern railroads, Mr. Webb stated, additional advantages would include further reductions in transit time, made possible by increased traffic; a greater range of direct to destination distribution of freight; substantially lowered loss and damage costs; absolute dependability of service under all conditions throughout the year, and the possibility of simplification of packing requirements.

Under the complete program, he also pointed out, smaller communities will be afforded a service comparable with that now available only to the large cities and towns. Key agents will be established at strategic locations, giving shippers in smaller towns, who now do not have direct contact with railroad representatives, the advantages of such contact.

Under the proposed arrangement pick-up and delivery

truckers also will act as agents for the rail carrier, with many advantages to patrons. For example, merchants in smaller towns where a railroad representative is not available, now receive their merchandise only on a prepaid basis. Under the new plan the receiver or shipper at a non-agency station may conveniently settle his freight bill with the trucker who delivers or picks up the shipments.

"The 'collect on delivery' feature which has been made a part of the pick-up and delivery arrangement is a particularly valuable adjunct to our general service, not only at non-agency, but agency stations as well," Mr. Webb testified.

Testifiying as to the economies possible to the railroads as a result of pick-up and delivery, Mr. Webb said: "From the viewpoint of operation the additional revenue the Pennsylvania has received under the present pick-up and delivery tariff (years 1934-1935), as compared with 1933, amounting to $6,028,710, has offset the cost of handling the additional traffic, amounting to $1,080,396, and the drayage expense of all pick-up and delivery traffic handled amounting to $2,184,107, and has left a balance of $2,764,207." Additionally, with the inauguration of complete service on the Pennsylvania, Mr. Webb testified, an annual saving of $2,502,485 would result. This saving would be accomplished by a concentration of freight station facilities, reduced station and transfer handling in the larger terminals, reduced switching and floating expense, reduced expense for intra-terminal station-to-station trucking, reduction in loss and damage, elimination of way stations, and greater utilization of freight car cubical capacity, requiring the use of fewer cars.

P.R.R. Gets 6 Tons Per Car, C. & D. Will Raise It to 8

The witness revealed that already the Pennsylvania, partly as a result of existing pick-up and delivery service, has developed the highest average loading per "less-than-carload" box-car in recent years—6.06 tons per car. "With the full use of pick-up and delivery, and the full utilization of our zone concentration plans," Mr. Webb testified, "we can increase our load per car to approximately 8 tons."

Questioned as to the volume of less-than-carload business which the Pennsylvania may secure through the proposed complete service, Mr. Webb said: "A study was made at representative stations throughout our railroad and the estimates amounted to 25 per cent additional less-than-carload traffic under the proposed tariff. Our conclusions also are that unless pick-up and delivery service is continued and extended on our railroad we will not only lose the benefit of the 25 per cent additional traffic that we have mentioned, but we will lose traffic which we are now receiving."

Mr. Webb said the estimated increase of 25 per cent in less-carload traffic which would result from the inauguration of complete service will, after the deduction of out-of-pocket expense for its handling, taking the proposed economies into consideration, leave the railroad a balance of approximately $3,000,000. He said that "under the proposed tariff it is anticipated that our increased traffic will be that of the higher-rated commodities, materially adding to the gross revenue per car of less-than-carload freight."

Complete pick-up and delivery service would "decrease the cost of transportation to the public, furnish an improved service, decrease the cost to the carriers, and increase the volume of traffic," James R. Downes, assistant to the president of the Pennsylvania, testified on June 22. "The tendency of industry," continued Mr. Downes, "with the imposition of high transportation rates upon the public, eventuating out of the period of the World War, is to decentralize and avoid as far as possible the costs of transportation. The practical effect of the eventual lowering of the transportation costs to the public will be a freer flowing of goods and the creation of more traffic through the creation of prosperity and, in the end, will accomplish what we are all striving to do: that is, increase employment in all lines of industry."

Public Entitled to Better Service, Lower Costs Which Roads Are Offering

Mr. Downes explained that one of the important effects of pick-up and delivery so far as the railroads themselves are concerned, is to increase the loading per car, and thereby reduce the cost of transportation per ton by spreading those costs which are of a fixed nature over a larger number of tons. What the carriers are seeking to do, he pointed out, is to build up the tonnage in this traffic by developing the volume through the improved service of pick-up and delivery. The effect of increased volume will be not only to increase the load per car, and consequently the revenue per car, but to decrease the cost per unit in road service. These savings, together with the other inherent economies in pick-up and delivery service, such as the concentration of freight station facilities, reduction in station and transfer handling in larger terminals, reduction in intra-terminal station-to-station trucking, lower loss and damage costs, and the elimination of way stations, will much more than offset the drayage expense and other additional costs involved in the movement of the increased pick-up and delivery traffic, Mr. Downes said.

Mr. Downes advised the commission that in his opinion, if the railroads attempted to attract traffic simply by the device of reduction in station-to-station rates, without pick-up and delivery, such reduction would have to go beyond the cost of drayage which the railroads propose to assume, and the service would still be lacking in attractiveness to the shipper because of failure of the railroads to offer complete door-to-door transportation, with the result that "the railroads might find themselves in the position of handling a lesser amount of traffic at lesser charges, producing higher unit costs."

Asked whether he felt the application of the tariffs under discussion would in any way be detrimental, Mr. Downes replied:

"I do not. Many years ago the Pensylvania recognized the necessity for eventual complete co-ordination of the rail and the highway transportation services, to the end that the public would have the best, low-cost service, performed by each agency in the sphere wherein it best is fitted to perform the service. In line with this, the various experiments that the Pensylvania has made —with containers, truck bodies, and pick-up and delivery service—have all contemplated co-ordination with the truck in furnishing the complete service, and the furthering of the use of both forms of transportation.

"It also recognizes that the trucks have a great part to perform in transportation; that the more transportation is increased by volume the more business there will be both for the rail carrier and for the highway carrier, each performing its own service at the highest efficiency and, thereby, at the lowest cost to the shipper, so that each can create more business for itself and for each other through natural co-ordination than will ever be possible through restrictions.

"Restrictions retard development. The transportation system of the country cannot develop to that degree of efficiency necessary to a modern and developing indus-

(*Continued on page 1060*)

Many 1935 Railroad Reports Discuss Motor Transport Operations

Executives included more than the usual number of comments on co-ordinated bus and truck services

Part II

RAILWAY annual reports for 1935, as was pointed out in Part I of this article, included more than the usual number of references to highway operations of the railroads and their affiliated companies. These references, in the main, were of the same type as in previous years, many being general expressions of satisfaction with the results of 1935 bus and truck services but some including separate income accounts and other data on the operations of highway affiliates.

The above-mentioned Part I, which appeared in the Motor Transport Section of the *Railway Age* of May 23, presented abstracts from motor transport discussions in the annual reports of the Southern Pacific, the Atchison, Topeka & Santa Fe, the Union Pacific and the Chicago, Burlington & Quincy. Excerpts from such discussions in additional 1935 railroad reports are presented below.

Missouri Pacific and D. & R. G. W.

The Missouri Pacific Transportation Company, according to the annual report of its parent railroad's trustees, extended its highway routes during 1935. The extensions were from Paola, Kan., to Pueblo, Colo., 628 miles; from Atchison, Kan., to Beloit, 173 miles; and from Natchez, Miss., to New Orleans, La., 185 miles. Minor changes on other routes due to highway construction added another 104 miles, making a total of 5,085 miles of highway routes as of December 31. The report's financial statements show that the Missouri Pacific holds the transportation company's 1,000 shares of capital stock, having a par value of $100,000; also the railroad had made to the subsidiary advances totaling $5,614,623 as of December 31.

Trustees of the Denver & Rio Grande Western report no changes during 1935 in that road's "holdings of stock in motor way subsidiaries." The report reveals, however, the organization last year of the Denver-Salt Lake-Pacific Stages, Inc. to operate between Denver, Colo., and Salt Lake City, Utah. This new company is owned jointly by the Denver-Colorado Springs-Pueblo Motor Way, Inc. (a D. & R. G. W. affiliate), the Burlington Transportation Company and the Missouri Pacific Transportation Company. At the close of the year highway operations of D. & R. G. W. affiliates covered 2,637 route miles, and the year's operation "produced satisfactory net income."

The D. & R.G.W. balance sheet as of December 31 lists, among securities pledged with the Reconstruction Finance Corporation, the road's holdings of Denver-Colorado Springs-Pueblo Motor Way and Rio Grande Motor Way stock with par values respectively of $42,000 and $130,000. Among unpledged investments in affiliated companies is listed the Rio Grande Transport Company's issue of stock with a par value of $300. In 1935 the D. & R.G.W. received from its motor operations a dividend income of $7,140 as compared with $20,480 in 1934.

Cotton Belt and Kansas City Southern

The Southwestern Transportation Company, according to the annual report of its parent railroad, the St. Louis Southwestern, reported for 1935 a net income of $33,442. Its gross revenue was $522,451 and its operating expenses $481,140, thus leaving a net from operations of $41,311. Taxes of $30,022, uncollectible revenues of $89 and other adjustments brought this down at the "net railway operating income" stage to $11,338. To this latter was added dividend income of $21,956 and interest income of $147 to produce the above-mentioned net income of $33,442. At the close of last year the transportation company's profit and loss account showed a credit balance of $84,088. Its balance sheet listed total assets of $1,935,449, including an investment of $681,138 in "road and equipment;" among "investments in affiliated companies" is a $785,798 item labeled "advances," while among "other investments" are shown stock holdings totaling $257,890.

In his general remarks President Daniel Upthegrove states that the Southwestern Transportation Company, as of the close of last year, owned 79 motor trucks and 3 buses, the latter "held for conversion to freight service." During 1935 the subsidiary handled 53,217 tons of merchandise. Its holdings of Southwestern Greyhound Lines securities include preferred stock with a par value of $95,300, and 800 shares each of Class A and Class B common, both without par value. A table in the report shows that at the close of last year the Southwestern Transportation Company's 1,000 shares of no par stock, having a book value of $1,481,100 had been pledged by the parent railroad as collateral for a loan from the Railroad Credit Corporation.

The Kansas City Southern Transport Company is described in the report of President C. E. Johnston of the Kansas City Southern as "A company organized under the laws of the State of Louisiana to contract for the collection, transportation and delivery of less-than-carload freight. It owns no equipment or real property, and is controlled by your company through ownership of all the capital stock." The financial statements reveal that the Transport Company reported for 1935 gross revenues of $4,224; its operating expenses were $4,096 and the net from operations $128. After taxes of $96 it had a net income for the year of $32.

Great Northern and Soo Line

The Great Northern report points out how l.c.l. pick-up and delivery service, inaugurated to a limited extent during 1935, was made general in January of this year. President W. P. Kenney anticipates that the resultant speeding up of l.c.l. should enable the railroad "to re-

apture much of the business formerly lost to the truck lines during the past few years." The report's list of investments in affiliated companies reveals that the Great Northern's holdings of Northland Greyhound Lines common stock are carried at a book value of $884,268.

In commenting upon l.c.l. freight traffic of the Minneapolis, St. Paul & Sault Ste. Marie, President C. T. Jaffray notes that trucks and forwarding companies are still making large inroads, but expresses the hope that storedoor services inaugurated in January will attract a considerable portion of this business back to the rails. He is also hopeful that the Motor Carrier Act will bring about more equitable competition and suggests that its tariff-filing provisions "will enable the railroads to gage in advance the competition they have to meet."

Illinois Central and Central of Georgia

L. A. Downs, president of the Illinois Central, makes no comment on the highway operations of that road's affiliates but condensed financial statements of the latter are included in the report. No income account figures are given for the Central Transportation Company of Illinois or the Central Transportation Company (Iowa) but the balance sheets of these show respectively total assets of $5,300 and $5,223, consisting of cash and accounts receivable; neither is shown to have any investment in property. The Mississippi Valley Transportation Company reported for 1935 a gross revenue of $42,313 and operating expenses and other charges of $42,304. A footnote says that the income or deficit is taken up in the railroad's income account. Like those mentioned above the Mississippi Valley had no entry for property investment among its total assets of $5,383.

No specific comment on the Central of Georgia Motor Transport Company is found in the report of H. D. Pollard, receiver for the parent railroad. The report's tables reveal, however, that the railroad holds unpledged the subsidiary's entire $5,000 issue of capital stock; also, the former has made advances totaling $5,729 to the highway company.

A.C.L., N.C. & St.L. and R.F. & P.

George B. Elliott, president of the Atlantic Coast Line explains in his 1935 report the storedoor service for l.c.l. which that road inaugurated in February of this year. This tariff offers an allowance of five cents per 100 lb. to patrons performing pick-up or delivery themselves, and Mr. Elliott says that A.C.L. contracts under the tariff with local truckmen provide for payments "approximately equivalent" to the amount of this five-cent allowance. He hopes that c. & d. will be successful not only in retaining l.c.l. but also in recovering "part, at least, of that which has been lost to the store-to-store service offered by motor trucks."

Mr. Elliott explains briefly the salient provisions of the Motor Carrier Act, noting that motor vehicles used in carrying agricultural commodities are excluded from regulation. Thus he does not think it will have much effect "in diverting citrous fruit and other agricultural products from trucks to rail service."

The Nashville, Chattanooga & St. Louis report, evidently anticipating this year's tariffs, speaks of plans "near consummation" for broadening pick-up and delivery service. President Fitzgerald Hall is confident that when the Motor Carrier Act becomes fully operative "our competitive situation with highway vehicles will be substantially strengthened."

The Richmond, Fredericksburg & Potomac report lists among that road's investments in affiliated companies its holdings of stock and advances to the R. F. & P. Transportation Company. The stock has a par value of $90,000, the figure at which it is carried on the books while the advances amounted to $12,000 on December 31. Among "other investments" is shown the R. F. & P. interest in the Richmond-Greyhound Lines—stock having a par value of $98,000 and a book value of $105,000. President Norman Call makes no comment on the R. F. & P. highway operations, his only reference to motor transport being a brief outline of the Motor Carrier Act's provisions with an expression of his opinion that this measure "will definitely contribute to the orderly regulation of transportation as a whole throughout the United States."

Pennsylvania, Erie and Reading

Under the heading "Collection and Delivery Service" President M. W. Clement discusses in some detail the Pennsylvania's operations in that connection. He points out how storedoor service, orginally established as an experiment on December 1, 1933, has been made permanent and supplemented by a cash on delivery service. This latter, he says, "provides a means by which merchants are enabled to extend materially their areas of sales without furnishing additional facilities of their own to establish credit relations." He further characterizes the development as "an additional forward step in meeting modern trends of business practice." Collection and delivery freight at the close of the year constituted approximately one-third of the Pennsylvania's l.c.l. traffic—the number of shipments so handled in 1935 was 50 per cent in excess of those handled in 1934.

Coming to more recent developments Mr. Clement refers to the system-wide unrestricted storedoor tariffs published this year (but suspended in the East by the I.C.C.) calling the railroads' action in that connection "the most important move yet undertaken to recover to the rail lines a large volume of traffic now moving by motor truck."

C. E. Denney, president of the Erie, which also pioneered in Eastern c. & d. experiments, mentions briefly the influence of such service on that road's 1935 revenues from l.c.l. freight. The latter was $5,478,924 as compared with $5,187,894 in 1934.

Motor coach routes operated by the Reading Transportation Company remained unchanged in 1935 but there was an increase of 93.8 miles in its truck routes. The latter, President Edward W. Scheer of the parent railroad points out, was due to the extension of the Reading, Pa.-Pottsville route to Frackville (14.9 miles); the rerouting of train-substitution lines on the Philadelphia division (9.6 miles); and the establishment, as fixed routes, of service between Pottsville and Girardville (42.3 miles) and Reading and Allentown (27 miles). These latter two had previously been operated as alternate routes. Equipment in service at the close of last year included 51 buses, 37 trucks, 22 tractors and 34 semi-trailers, an increase of 42 vehicles as compared with December 31, 1934. The Reading owns the total capital stock of the Transportation Company which has a par value of $600,000.

New York, New Haven & Hartford

Separate income accounts and balance sheets of the New York, New Haven & Hartford's several affiliates operating highway services are included in that road's report. Those operating highway services exclusively are the New England Transportation Company, the County Transportation Company, the Soundview Transportation Company, and the Berkshire Street Railway Company, which now operates only bus services. The New England reported for 1935 a net deficit of $220,648

as compared with a 1934 loss of $165,435. Gross revenues for 1935 totaled $3,609,292, an increase of $127,874 over 1934; passenger revenues declined by $87,902 but meanwhile there were increases respectively of $182,122 and $33,654 in freight and "other" revenues. Operating expenses for 1935 were $159,152 in excess of 1934 and last year's net operating revenue of $219,162 was $62,124 short of covering tax accruals amounting to $281,286; this latter was $16,539 in excess of the 1934 tax accruals. Other income increased by $535 to $6,548, reducing the deficit at the "gross income" stage to $55,576. Deductions from gross income, amounting to $165,071, an increase of $7,930 as compared with 1934, produced the above-mentioned 1935 deficit of $220,648. The N.E.T. balance sheet as of December 31 lists total assets of $5,983,599, an increase of $55,780 as compared with 1934. The New Haven's financial interest in New England remained the same as of the close of 1934—a total investment of $2,818,500, including $1,500,000 of the subsidiary's capital stock and $1,318,500 of its notes.

The County Transportation Company earned a 1935 net income of $9,756, an increase of $40 over 1934. This was accomplished through a decrease of $6,690 in operating expenses, since gross revenues declined $1,179, taxes increased $2,074 and other income fell off by $1,006. The gross amounted to $394,531, including $388,846 in passenger and $5,685 in "other" revenue. As of December 31, the County, its balance sheet shows, had total assets of $718,771, a decrease of $901 as compared with December 31, 1934. It is a wholly-owned subsidiary of the non-operating New York & Stamford Railroad Company, which in turn is owned entirely by the New Haven.

The Soundview Transportation Company, which the New Haven controls through its ownership of the New York, Westchester & Boston, reported for 1935 a gross revenue of $40,362 and a net deficit of $1,570, an increase of $188 as compared with 1934. Since the routes of this company are all operated by the County under contract, the bulk of the Soundview's 1935 operating expenses—$38,717 out of $38,732—went for rent of equipment. The Soundview's balance sheet shows total assets of $4,641.

The Berkshire Street Railway Company's 1935 deficit totaled $205,437, less by $16,130 than the 1934 loss. Its gross revenue last year was $400,845, an increase of $9,866 while its operating expenses were reduced by $10,230. This company's balance sheet as of the close of the year shows total assets of $741,243, although it carries a cumulative profit and loss deficit of $14,210,502. It is owned directly by the New Haven which holds a variety of its securities having a total book value of $10,257,296.

President H. S. Palmer comments in his general remarks briefly on the foregoing results, mentions motor carrier regulatory laws passed last year by Congress and states in which the New Haven operates, and includes a paragraph on the New Haven's proposed participation in the Eastern pick up and delivery tariffs, which were subsequently suspended by the Interstate Commerce Commission. Of the c. & d. proposal he says that "Although the inauguration of this service will be at no increase in rates, it is anticipated that the complete transportation service thus afforded shippers will be so attractive as to return to the rails much of the less than carload traffic now moving over the highway."

Boston & Maine and Maine Central

E. S. French, president of the Boston & Maine reveals that this road's highway subsidiary—the Boston & Maine Transportation Company—reported for 1935 more gross revenue from bus operations than in any previous year in its history. Also, its trucks handled a greater volume of freight than in 1934, both for the railroad and its own account. These operations of the subsidiary, he says, "were again of substantial benefit to the railroad during the year—directly through its handling of certain freight traffic for the railroad and indirectly through the substitution of highway operations for unprofitable rail service." From the Motor Carrier Act, when fully in force, Mr. French anticipates that "some relief will be afforded the railroads by the elimination of unfair and unregulated competition."

A brief discussion of Maine Central Transportation Company operations is included in the report of its parent railroad of which Mr. French is also president. The M.C.T. purchased two new highway routes and inaugurated a third during 1935. Its purchase in June of the property and assets of the White Line, Inc., enabled its own Portland-Bangor line to handle all business offered by removing restrictions on local traffic between Lewiston and Waterville. Earlier in the year it acquired the Portland-Bridgton line of the Whitman-Sawyer Company; during last summer this line was extended through to Glen, N. H., and since September it has been operated between Portland and North Conway, N. H. The line inaugurated is that between Bangor and Calais which was launched last June. As a result of the Transportation Company's 1935 operations, "$86,297.05 was contributed to Maine Central Railroad Company income, an increase of $14,078.13 over the previous year."

I. C. C. Continues C. and D. Hearings

(*Continued from page 1057*)

trial life or to an adequate means of national defense if the rail carriers are to be relegated or restricted to furnishing merely a truncated service which will not adequately meet demands at origin or destination. It is our firm belief that the trucks and the rails, and their allied industries, working together, can produce better transportation, with lower rates, and with improved service to the public, through co-operation and co-ordination rather than by antagonism. The result of regulation between the rails and the trucks should be equal opportunity to provide equal service at equal rates, and the evolution of this will produce better rail transportation and better highway transportation, at lower costs to the public."

The Washington hearing was concluded on June 23 and further hearings were to be held in New York beginning June 25 and Chicago beginning July 21.

The adjourned hearing was reopened by Examiner Archer in New York on June 25. The first day was devoted to further railroad testimony favoring the collection and delivery service. The protestant truckmen were expected to start the presentation of their testimony on the second day. In addition there were to be heard at New York upward of a dozen representatives of important shipping interests—unanimous in their demand that the railroads be permitted to provide free collection and delivery service. Among the shippers friendly to the railroads' cause who were represented were the chambers of commerce of Brooklyn, N. Y., Camden and Passaic, N. J., and Philadelphia, Pa., and the Atlantic States Shippers Advisory Board. A solitary opponent among shippers was a representative of the Queensborough (N. Y.) chamber of commerce.

Recent Equipment Developments...

Welded Draft Sill Stands Severe Test

AMONG many novel features incorporated in the new all-welded steel box- and refrigerator-car designs, recently developed by the Pullman-Standard Car Manufacturing Company, is the welded draft sill and body bolster center filler construction. The parts mentioned are usually riveted to the sills, but in the case of the two cars mentioned, the draft lugs and the center filler are made of rolled plates and bars, applied by electric welding in such a way as to form integral parts of the center sills. The purpose of this construction is to secure decreased car weight without sacrifice of strength and also to save the maintenance cost of replacing rivets which may work loose under the stress of severe road service.

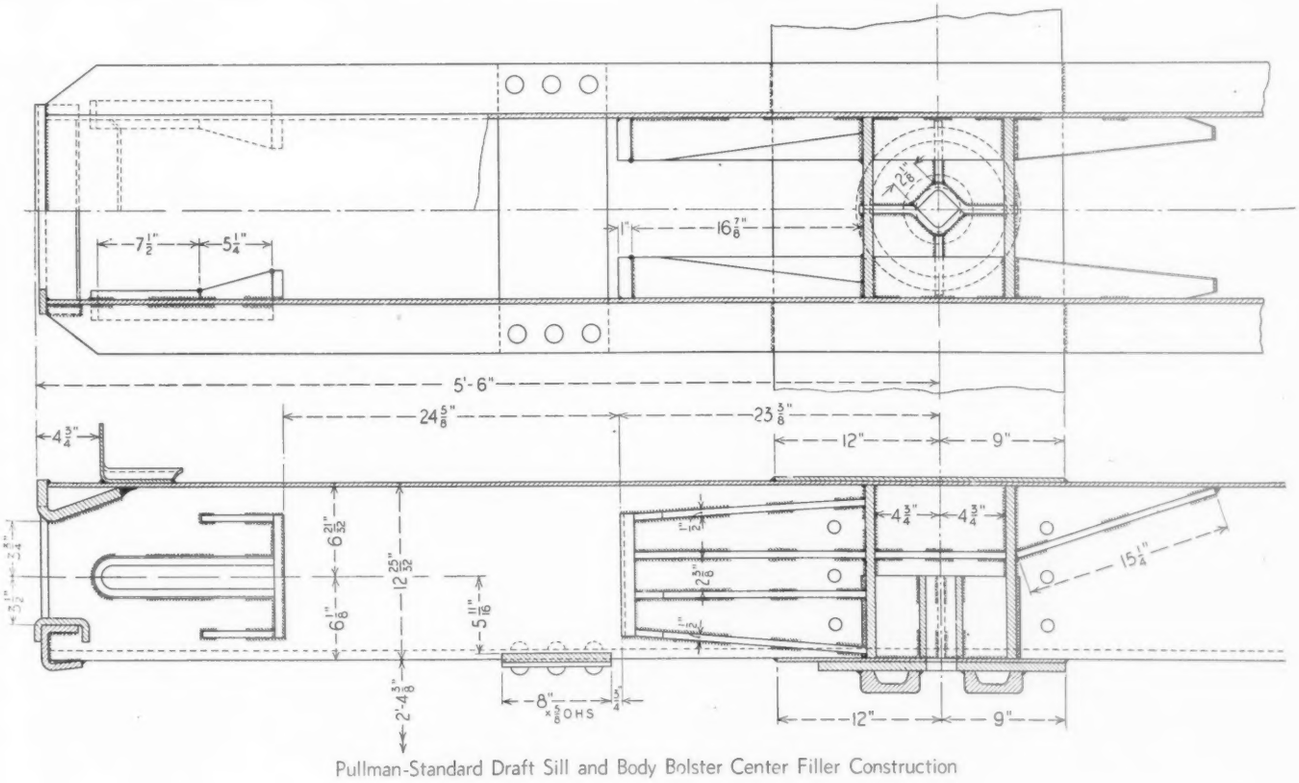
The strength of the Pullman-Standard welded draft sill and center filler construction was found to be greater than that of the corresponding A.A.R. conventional riveted design as shown by extensive tests conducted early this year at Purdue University, Lafayette, Ind. Test specimens were prepared by using a section of center sill long enough to extend through the bolster center fillers. One center sill section was made from ordinary structural steel and to this was riveted the A.A.R. standard combined bolster center filler and draft lug casting. The other steel section was made of Cor-Ten steel, being of smaller cross-sectional area than the structural steel, and in this was built up the rear draft lugs and bolster center filler pieces, the parts being electrically welded in place.

Previous tests had demonstrated that in a test specimen like this the lower end of the sill would fail by buckling before the welded draft lugs failed. In order to permit carrying the test to the point where the lugs failed the sills of these two test specimens were reinforced. To the bottom of the specimen was welded a smooth plate for bearing on the base of the test machine. A horizontal collar was welded around the top of the specimen at the level of the draft lugs. Between this collar and the bottom plate bent sheet steel reinforcing ribs were welded on the outside of the sill. Reinforcing gussets were welded between the bottom plate and the sides of the sills, and three cross straps and one plate were welded across the flanges of the sills.

The tests were made under the 27,000-lb. tup of the A.A.R. drop test machine, the specimen being rigidly fastened in an upright position on the steel base of this machine. The height of the first series of drops was one-tenth inch, this being mainly to seat all of the parts firmly. The second series of ten drops was from a height of one-half inch, and for each succeeding series the height of drop was increased one-half inch. This procedure follows essentially that used in making a sturdiness test of a draft gear, except that in this case the test was not stopped after the two-inch cycle but was continued until failure occurred.

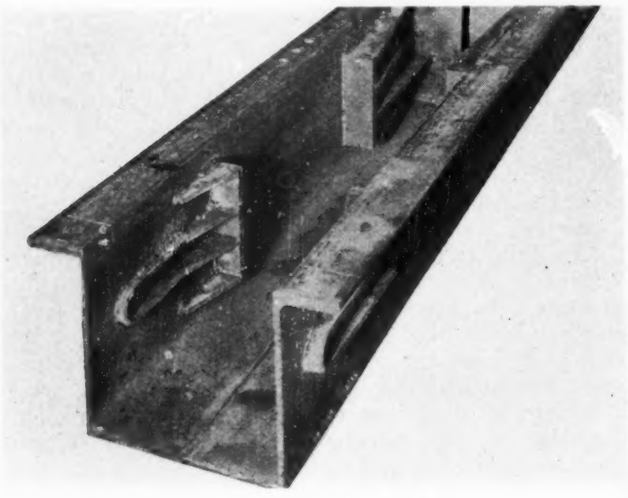
The height of drop of the tup and the penetration after striking the specimen were measured from a datum height which was established before each series of ten blows by resting the full weight of the tup on the test specimen. Check measurements of the specimen were taken after each cycle of blows and the test was continued until failure had definitely occurred. After the completion of the test a full set of measurements of the specimen was made.

According to the report of results secured in these



Pullman-Standard Draft Sill and Body Bolster Center Filler Construction

tests, the riveted specimen was unserviceable after the 4½-in. cycle of blows, failure occurring by distortion of the draft lugs and shearing of four rivets. The welded specimen, on the other hand, required the blows to be carried to the 6 in. cycle before it was unserviceable. Failure occurred by breaking of the welds along the edge of the draft lugs and buckling of the tops of the sills. In other words, the strength of the welded construction was greater under the drop tests than the



View Showing Application of the Welded Draft Lugs in the A.A.R. Center Sill

A.A.R. sills to which the lugs and center filler were welded, indicating that there would be no advantage in increasing the strength of the welded structure beyond this point.

Besides showing greater strength in welded construction, the report emphasized the fact that the welded lugs themselves are stronger than the riveted lugs. The four ribs under the welded lugs are placed so as to afford better support than do the ribs of the cast filler, and this reduces distortion of the lugs under impact. The welded structure eliminates the slippage which occurs between the parts of the riveted construction, and this will result in maintenance of less slack in the draft attachments by preserving the correct spacing of the draft lugs. Failure of the welded lugs on these reinforced sills occurred in such a way that repairs could easily be made by renewing the buckled lug supports.

Panel Insulation for Refrigerator Cars

ONE of the recent developments of the Alfol Insulation Company, Inc., New York, is that of Alfol aluminum foil insulation in panel form.

In many installations Alfol is applied by hanging successive layers of crumpled foil in the insulating space to build up the required thickness of insulation. These curtains are from ⅜ in. to ½ in. apart.

For car applications, for the purpose of quick installation, Alfol is now assembled in panel form. The panel is a sub-assembly in which the layers of Alfol are applied and held in position in a laminated frame built up with ½-in. by 1¼-in. strips of rigid insulating board or wood. The Alfol layers are applied with surfaces slightly crumpled so that they will accommodate themselves to strains and assure spacing with minimum of contact. The panel is covered and protected on each side with heavy reinforced waterproof paper.

This Alfol panel is a structural unit which can be handled and re-handled without damage and which, while large in area, can be handled easily by one man. The average weight of a panel is about 20 lb. for a panel approximately 4 ft. by 8 ft. and 3½ in. in thickness.

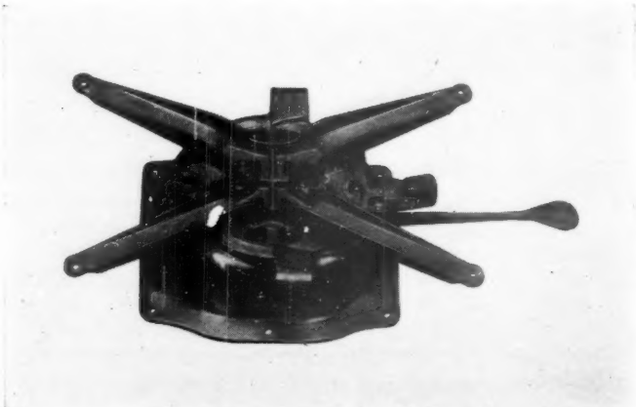
The panels are quickly installed by placing them in the space provided for by the car framing. They are located to minimize areas of through heat transfer caused by framing members and to eliminate detrimental air pockets. The panels being self-supporting completely fill the rectangular areas in a refrigerator car so that these areas can be insulated with the full thickness of insulation over their entire surface.

The advantages of this type of insulation are that it can be applied in production in minimum time; it has an extremely low weight; it is absolutely resistant to the most severe vibration; it provides high insulating efficiency for a maximum area of coverage; it cannot absorb moisture, and maintains its high efficiency permanently.

Rotating Base for Passenger Car Seats

AN important feature of the construction of modern passenger car seats manufactured by the Heywood-Wakefield Company, Gardner, Mass., is shown in the accompanying illustration. This is a lightweight rotating base designed for modern deluxe coach chair cars which makes possible the use of a larger reclining type of chair in a minimum of space without sacrifice of comfort. In this rotating base the operating mechanism is mounted directly on a combination top bearing plate and aluminum pedestal casting. The spider, hold-down clamps and the treadle are also aluminum castings.

The malleable-iron operating links swing in a depressed well in the top of the pedestal bearing plate from



Heywood-Wakefield Type S-12 Rotating Base for Deluxe Coach Seats

large diameter bearings. The rotating plate, combined with the spider, rotates on the pedestal bearing plate, pivoted on bearings located on the outer ends of the links. Two hold-down clamps located on the front and rear of the pedestal bearing plate and one on the aisle end of the mechanism, help hold the rotating plate both

when in position and while revolving, thereby eliminating play and vibration. A steel stop pin, bolted to the top bearing plate, holds the chair in position.

An easily accessible foot treadle is located on the aisle end of the mechanism. Pressure exerted on the treadle releases the mechanism for rotating. The ball-tipped lock pin is held under compression while the chair is turning by the rotating plate. A heavy compression spring automatically locks the chair in place after being rotated into position.

Four bosses on the ends of the spider arms provide means for fastening the mechanism to the seat frame. The pedestal has six holes for fastening the mechanism to the floor.

The action of the operating links is to draw the chair away from the wall before the actual revolving is started. This arrangement permits the chair to be set in closer to the wall of the car, yet enables it to rotate freely. This movement also permits closer seat spacing because as the chair rotates the center of the chair moves forward on the mechanism.

The weight of this mechanism is 23 lb. and the minimum height from floor to top of spider is 7¾ in. When it is necessary for the seat to clear heater lines, higher than 7 in. metal adapters are used between the spider and underside of seat frame.

Locomotive Stoker for Handling Wet Coal

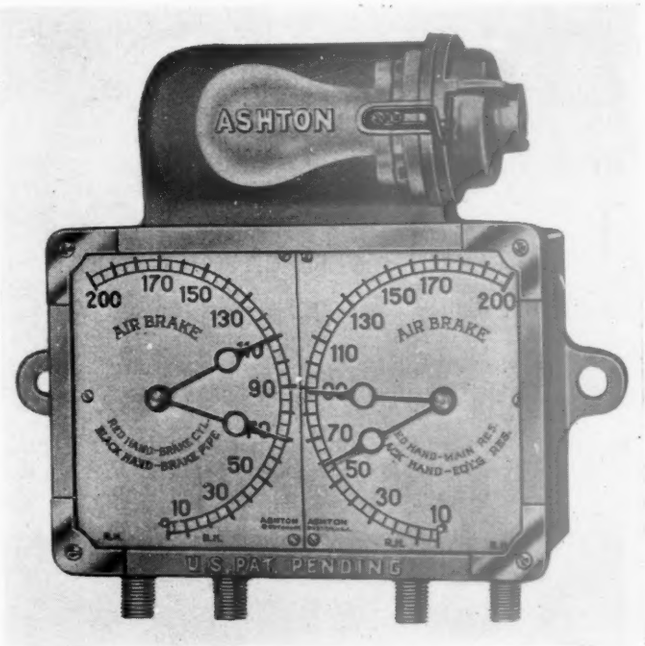
MECHANICAL firing of locomotives presents many interesting problems. Among others recently confronting the engineers of The Standard Stoker Company, Inc., Chicago, was that of handling a grade of coal which when wet, was inclined to pack or clog in the conveyor system.

To meet this condition they developed what is known as the Type H-T stoker, shown in the illustration. In this design the conveyor screw is extended to the firedoor opening so that, regardless of the condition or character of the coal, it is delivered in an even and continuous stream to the stream jet distributor.

Among other incorporated features are adjustable vanes which can be set to deliver the coal to any portion of the grate as may be required to meet any variation in burning rate; and a two-pressure adjustable steam distributor jet, the high pressures acting on the larger sizes and the low pressure on the fine sizes, thereby providing improved distribution and reduced stack loss under practically any conditions. The deck entrusion and space taken up on the boilerhead is reduced to the minimum.

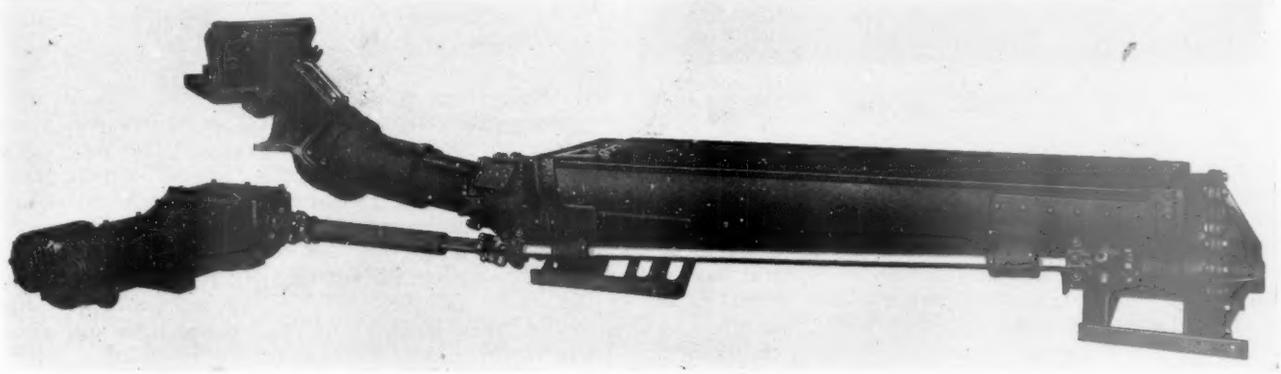
Dust-Proof Locomotive Steam and Air Gages

THE Ashton Valve Company, Boston, Mass., has recently made several improvements in the construction of gages for railroad service. Typical of some of the improved types is the gage shown in the illustration which is the Ashton quadruplex air brake gage.



Ashton Quadruplex Air Brake Gage with Interchangeable Light Hood and Dust-Proof Casing

The air brake gage, No. 62-QI-3 and the locomotive double-dial steam gage, No. 52-DI-2 (not shown) have one improvement in common in that the lighting hood is cast integral with the gage casing and the lighting unit—the socket and cover—is interchangeable with that of the duplex air gage. This feature makes it pos-



Type H-T Standard Stoker with Conveyor System Designed Especially for Handling Wet Coal

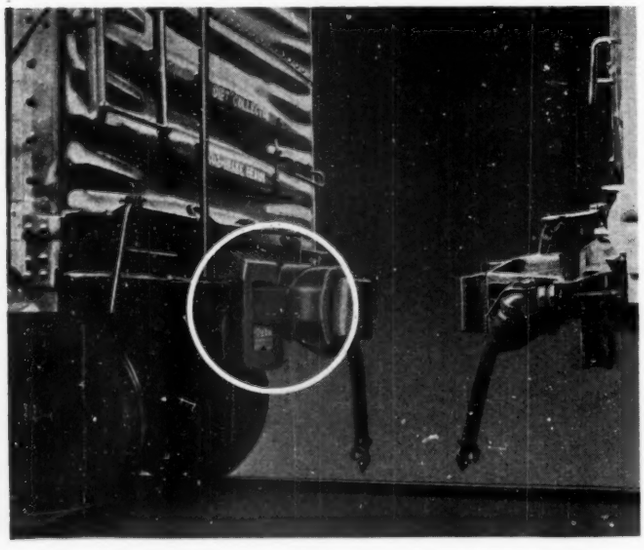
sible to remove the gages for testing without disturbing the electrical connections. These gages have been made so that they are positively dust-proof by the introduction of felt gaskets in all joints. The dials of these gages are of dull white porcelain enamel which eliminates glare. The steam gage may, however, be furnished with black or silvered dials, if desired.

The dust-proof feature, mentioned above, has also been added to the Ashton air brake gage No. 62 B.A.B., when so ordered. This gage has the special feature of an adjustable shield that may be readily secured in four positions thus permitting the gage to be used for any one of four services indicated on the face of the dial, a feature that makes it possible to reduce the number of gages which need be carried in stock. This latter gage is not illustrated.

Coupler Carrier and Centering Device

THE illustration accompanying this article shows the application of the Gee-Bee coupler carrier and centering device manufactured by the Gustin-Bacon Manufacturing Company, Kansas City, Mo. This device automatically returns the coupler to the center line of the striking plate, making it unnecessary for anyone to go between the cars to center the coupler by hand. This facilitates the switching of cars in yards and lessens the liability of injury to employees.

This device consists of four parts: a carrier casting which supports the coupler shank between lugs at the ends of the casting, a housing and two rollers. The



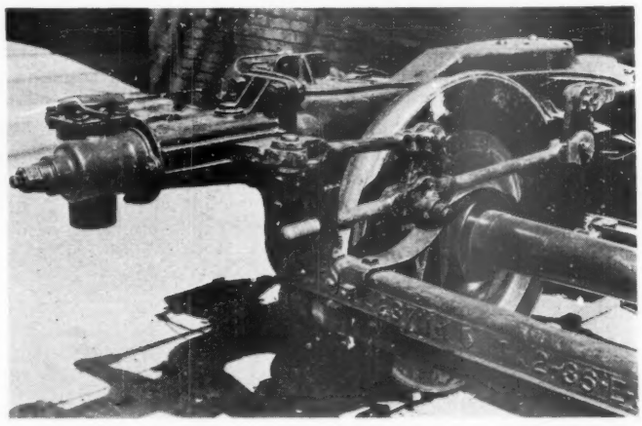
The Gee-Bee Coupler Centering Device in Place in the Striking Casting

rollers are held in the assembled device in such a manner that any movement to one side or the other causes the carrier to lift by reason of the rollers moving on cam-shaped surfaces. The automatic return of the carrier casting to its lowest point centers the coupler.

This device fits into and forms an integral part of the coupler striking casting and it is not dependent on cotters, bolts, trunnions or other parts that may fail in service. If for any reason it is found desirable to remove the centering device from the striking castings it can be quickly lifted out after the coupler has been raised to give the necessary clearance. The use of this device is said to reduce wear on the drawbar, thereby eliminating the expense and delay incident to building up the conventional type carrier irons to maintain the proper coupler height.

Improved Slack Adjusters

THE Westinghouse Air Brake Company, Wilmerding, Pa., has developed several new types of automatic slack adjuster suitable for installation with truck-mounted brake cylinders, which are now being extensively used. The outstanding feature of the latest adjuster is the "divided engine" in which the adjuster piston and spring are located on opposite sides of the



View Showing Truck with Heavy-Duty Slack Adjuster (Forming the Intermediate Fulcrum for the Brake Lever) Attached to the End of the Truck Frame

ratchet nut, thus reducing the overall length. Various forms of this adjuster are manufactured to permit attachment to the cylinder head, to the end of the truck frame, or to the side. Several sizes are available to accommodate the braking forces as determined by the particular type of brake lever arrangement.

Resins for Cellulose Ester Lacquers

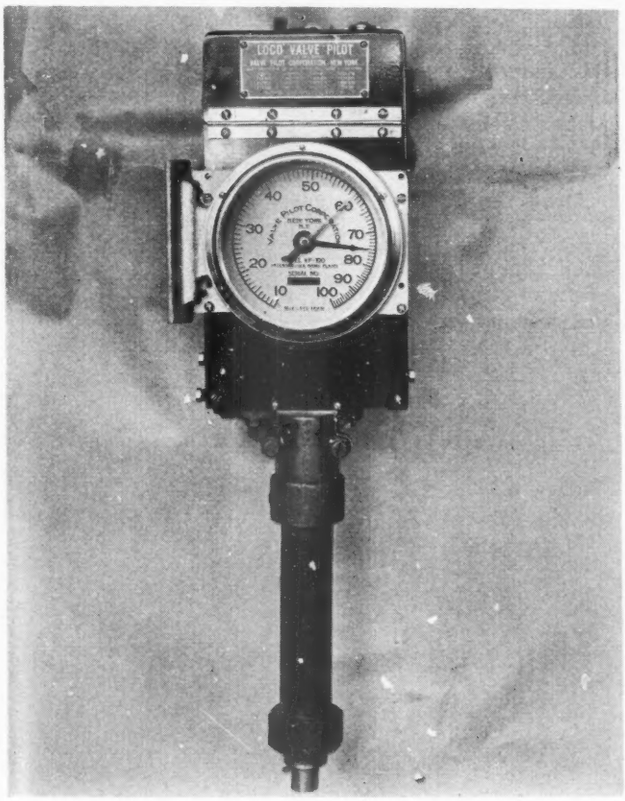
THE Bakelite Corporation, New York, has announced a new type of Bakelite resin which has been developed especially for use in cellulose ester lacquers of the modern high gloss, high solid content type. At present two modifications are available, XR-3180 and XR-4357. These new resins are the result of systematic research, extending over several years, in which the primary object has been to overcome to the greatest practical degree the recognized defects of lacquers previously available for certain exacting requirements. Chief among these has been the difficulty of obtaining a smooth, high gloss surface without the necessity of incurring additional expense for rubbing and polishing operations.

XR-3180 and XR-4357, in combination with nitrocellulose, yield lacquers of exceptional flow and gloss. Their high refractive index and excellent pigment wetting produce an attractive depth and lustre. The initial high gloss is retained remarkably well on exposure to weather

and even after long service these finishes may be cleaned and repolished with little effort. In addition to this important property, these resins are also outstanding in their resistance to moisture, oxidation, strong soaps, acids, oils and greases, and have an excellent degree of color stability. Their solutions in common lacquer solvents are low in viscosity, permitting the formulation of high solid content lacquers having excellent film building properties. Because of the combination of desired characteristics, lacquers based on these resins have particular value for the following applications: Automobile finishing and refinishing, refrigerators, kitchen furniture, cabinets, bathroom fixtures and imitation tile, hospital furniture, textile and paper coatings, metal lacquers for hardware and instruments.

Improvements in Locomotive Valve Pilot

AMONG the recent changes in the locomotive Valve Pilot manufactured by the Valve Pilot Corporation, New York, is the addition of two types of instruments developed to meet the general trend toward increased train speeds. These instruments have dials reading to 100 and 120 m. p. h. respectively. One of these, with the 100 m. p. h. dial, is shown in the illustration accompanying this article. In addition to these changes the manufacturer has developed a new governor mechanism, the component parts of which are made of heat-treated alloy steel and improved bronze alloys with external bearing surfaces precision ground and internal surfaces diamond bored. Also, heat-treated alloy steel gears are now used throughout the construction.



Loco-Recorder with 100 m. p. h. Dial

Improved Angle Cock Handles

THE Westinghouse Air Brake Company, Wilmerding, Pa., has developed improved handles for self-locking angle cocks, one of which is the double-locking type, designed to provide additional safeguard, and to insure longer life.

This design embodies a latch, incorporated within the handle body and projecting above the grip, which must be depressed, as by the trainman's thumb, to permit raising the handle by the fingers, to unlock and turn the cock key, thus making it impossible for the cock to be opened or closed by safety chains or with the foot.

The spring force used for this additional lock also serves, in conjunction with adjusting screws, to eliminate loose movement and consequent wear, which is sometimes caused by vibration while the car is in motion. Moreover, the hinge pin is of generous size and length to provide a large bearing surface. The socket is of the reenforced "split" type with a rivet, which engages a notch in the key, holding it securely in place. These several features all combine to increase service life and decrease maintenance cost of the handles.

Angle Cock With Improved Handle Having Double Locking Feature

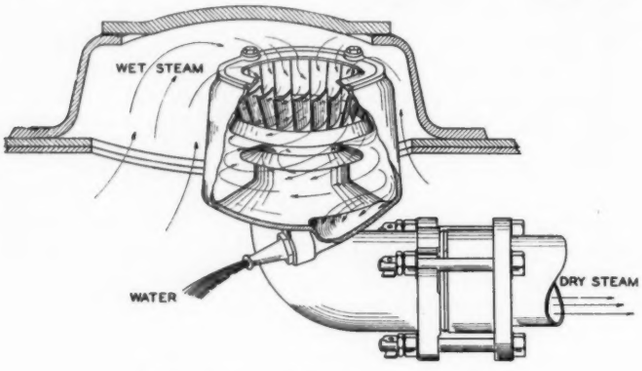
The present standard single-locking type is improved by providing a reenforced "split" socket and large hinge pin, to provide the wear-resisting characteristics.

Tangential Steam Dryer for Superheater Locomotives

THE demand for greater boiler capacities, which has been in evidence in recent years, has resulted in boilers more prone to carry moisture in the steam to the superheater, with harmful effects on the operation of the locomotive and the life of the superheater. The importance of dry steam being delivered to the superheater is illustrated by the fact that for each one per cent of water, by weight, that is carried over into the superheater with the steam, there is a drop of about 17 deg. in superheat. With large modern locomotives, which may carry over from 5 to 10 per cent of moisture into the superheater, the lowering of the superheat may be as much as 150 deg. F.

The need for an effective and efficient means of removing water and solids from the steam has been the

subject of research for many years by The Superheater Company, New York. The result has been a tangential steam dryer low in cost, with no moving parts, which



Sectional View of the Elesco Steam Dryer

will definitely remove water and impurities from the steam (a) permitting higher superheat and (b) preventing trouble from scale and sludge in throttles, superheater units, piston valves and cylinders.

The Elesco tangential steam dryer employs fixed turbine shaped vanes arranged within the body of the dryer, by means of which the entering steam is caused to whirl around with the result that all moisture and sediments are centrifugally separated and ejected through the tangential outlet nozzles at high velocity. The fixed vanes are designed so as to impart this whirling motion to the steam with a minimum of friction.

Brake Beam Support

AMONG the developments of the Grip Nut Company, Chicago, is the brake beam safety support, safety guard and brake release, which is designed to eliminate dragging brake shoes; prevent end wear and point wear on brake shoes and to hold the entire foundation brake gear in the proper operating position. This device is a foundation brake control which consists of rods connecting the brake beams through hanger castings on the brake beams with springs on the ends of the rods and the entire assembly locked in position with Grip Unit Nuts. When in position on the car the rods pass through the openings between the truck bolster and the spring plank, so that in the event of failure or loss of the brake beam hangers the rods merely drop about 1 in. and rest on the support provided by the spring plank. In this position they hold the brake beams high enough above the rail, so that no part of the brake beam, head, shoes or shoe key can catch in a frog or switch or be drawn under the wheels.

This device is said to accomplish the following results: It balances the brake beams, insuring proper braking position, thereby increasing the life of the brake beam and carrying the load in the position for which the beam was designed; all parts of the support are carried above the spring plank; all parts of the brake rigging are held firmly in position under spring tension which permits them to move easily and freely when the brakes are operated but eliminates the constant motion which wears out brake hangers, heads, etc.; releases the brake shoes from the wheels even when the cars are standing still, thereby eliminating the dragging of brake shoes with consequent increases in power required to start trains; eliminates end and point wear and reduces breakage of brake shoes.

The design of this device is such as to make it simple to apply, some roads reporting that less than one man-hour per car is required for labor connected with application. A feature of the design is that it is not necessary to drill holes in the spring plank in order to bolt the support to the plank, neither is any welding required for this purpose.

Direct V-Belt Drive

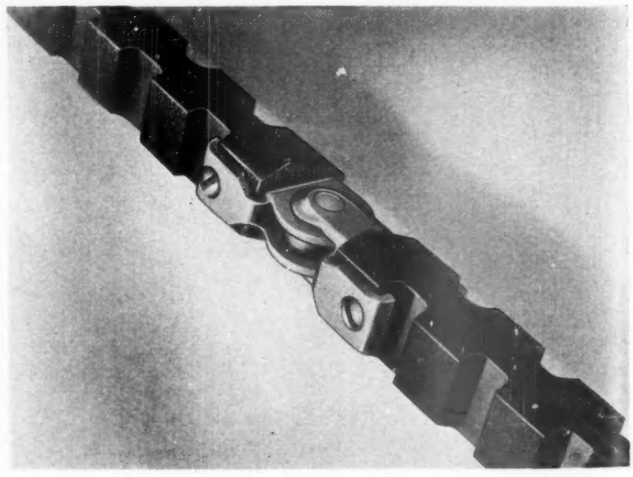
DOUBLE-angle V-belts and fasteners, designed for driving generators directly from the car axle, have been further developed for this purpose by The Dayton Rubber Manufacturing Company, Dayton, Ohio. The belts, which are used in multiple, are 7/8 in. wide. They are the standard DR V-belt modified by an increase in the width of the cogs and a corresponding decrease of the intervening spaces. This modification provides for more space between the fastener screw and the end of the belt. The covering of the belt has also been toughened to meet the rigorous service for which it is designed.

The connector consists of six parts which include the two halves of the fastener, the two clamp screws, the rocker-pin and a self-lubricating bronze bushing. The rocker-pin cannot be misplaced and there are no small parts to handle with numb fingers in cold weather.

The belts are used on body-hung generators, with no special provision except the V generator pulley and the split-V axle pulley, when the drives are mounted 5 in. or less off-center. On drives more than 5 in. off-center the application of belt guides is recommended.

A special trimming gage and punch insures easy and accurate fitting of the fasteners.

The axle pulleys are designed to make them light in weight and easy to install. The clamping bolts extend beyond the side of the pulley to facilitate access with



Dayton 7/8-in. V-Belt and Fastener

the wrench. Dowel pins on the inner faces of the rims keep the halves of the pulleys in alinement. On the larger diameter pulleys, two stud bolts are placed through the arms at the split to aid in holding the pulley halves tightly together. The pulleys have a standard diameter straight bore and are fitted to the axle by special wedge-shaped rubber bushings. The bushings are provided to correspond with the position of the pulley on the axle.

NEWS

Railroad Labor Leaders Lining Up for New Deal

Harrison heads division collecting campaign funds; B. of L. F. & E. endorses Roosevelt

That the movement to line up organized labor for the re-election of President Roosevelt is proceeding apace among railway labor organizations at least is indicated in recent activities of George M. Harrison, chairman of the Railway Labor Executives' Association, and of officers of the Brotherhood of Locomotive Firemen and Enginemen. The latter have given the President the Brotherhood's official endorsement while Mr. Harrison is actively campaigning as chairman of the Labor Finance Division of the Democratic National Committee.

The principal function of this division has recently been to enroll from among labor's ranks "Roosevelt Nominators" at $1 each. For this fee the "nominators" were entitled to admission to any of the numerous Democratic rallies held on June 27 when the President was scheduled to make his address accepting the nomination for a second term. Mr. Harrison in a statement issued on June 19 defended this method of raising campaign funds, saying at the same time that he is "not surprised" that it "causes concern in quarters where the prevailing idea has been to procure great contributions from those having special interests and designs."

Mr. Harrison continues to define his "special part in this great nationwide program" as "the rallying of labor," but adds that little rallying has been required because "labor men are joining the Roosevelt Nominators everywhere and the fact that it arouses special interests and time-servers will serve merely to arouse them to greater and more energetic participation." Labor men, it further appears, like the idea of "joining at $1 per person, because it is a democratic, popular method of raising a campaign fund for re-election of a President whose record justifies labor in its solid support"—it is a "rank and file movement and we like it."

Thus Mr. Harrison is "happy" to say that his division is receiving "enlistments," for "that is what we call them," in which entire unions, "to the last man," are enrolling. He calls the movement "one of the greatest demonstrations the organized workers have ever given" and is "proud of our record, proud of the participation of our membership everywhere."

The statement of the B. of L. F. & E. officers is published in the latest issue of "Labor," Washington publication of railroad labor organizations. D. B. Robertson, international president of the Brotherhood, made the announcement at the recent annual state meeting of Missouri B. of L. F. & E. lodges. The formal endorsement is signed by him and Arthur J. Lovell, vice-president and national legislative representative. It opens with a reference to economic conditions on March 4, 1933, when President Roosevelt was inaugurated and claims that "about the middle of the year 1933, the effects of the President's recovery program were beginning to bear fruit, and since July, 1933, we have been moving slowly but steadily forward." The railroads, it continues, have returned 200,000 employees to service, and "our Brotherhood has shown a net increase in membership of more than 12,000."

The invalidation of New Deal measures by the Supreme Court, it is contended, "does not change the fact that the President, fearlessly and in the face of considerable opposition from big business interests . . . moved forward with a definite program for national recovery." While there is "still room for improvement" the Brotherhood officers, "would certainly prefer to see the present program carried forward, augmented by new measures, based on experience . . . than to see a complete change of administration, with the welfare of the nation again placed in the hands of the party leaders who were in power when the whirlwind of financial and industrial destruction swept the country."

Believing themselves that the Roosevelt record "as to things undertaken and things achieved" justifies endorsement, the officers are led by "our observations" to the conclusion that "this thought is shared by a vast majority of the membership of our Brotherhood and organized labor in general, as well as the citizenship as a whole throughout the United States." The B. of L. F. & E. "legislative laws" are cited as authority for making the endorsement, which, the closing sentence says, "is given to President Roosevelt because of his accomplishments in behalf of the workers and the entire people and our confidence in the future welfare of the nation under his continued leadership."

Mr. Robertson, in an interview at Fort Worth, Tex., on June 18, stated that the B. of L. F. & E. will demand passage of a six-hour day bill at the next session of Congress. He was quoted as saying that railroad technical developments are "making it necessary for the railroads to look to the time when the work day will have to be lowered to six hours so more jobs can be created."

Congress Leaves Little New Transportation Legislation

Adjourns without taking action on several proposals, including co-ordinator extension

The seventy-fourth Congress adjourned sine die on June 20 without taking any action to continue even temporarily the office of Co-ordinator Eastman, which expired by statutory limitation on June 16, and without action in the House on the two labor bills passed by the Senate on June 6, the train dispatching bill and the signal and safety appliance bill advocated by the Railway Labor Executives' Association. The Senate also was prevented by a filibuster from reaching a vote on the revised Guffey coal control bill, passed by the House as a substitute for the law recently declared invalid by the Supreme Court. The bill included provisions for price-fixing which were opposed by the railroads on the ground that they would increase the cost of railroad fuel. Incidentally this was one of the bills for which it is understood the Eastman resolution had been traded.

None of the three successive resolutions proposed by Chairman Wheeler of the Senate committee on interstate commerce to continue the office of co-ordinator was brought to a vote in the Senate, although one to continue the office for one year without power to issue orders and with no specific reference to co-ordination had been reported favorably by the committee in place of the earlier one to continue the law for three more years without the labor restrictions. The later resolution, introduced by Senator Wheeler on June 18, provided merely for a continuation for a period of three months for the purpose of completing any pending investigations or reports.

The resolution providing for the continuance of the co-ordinator's office for 90 days provided that any funds now in the Treasury available to the co-ordinator should continue to be available and that any money left over should be returned to the railroads.

In introducing the resolution Senator Wheeler said that there had been so much opposition to the continuance of the co-ordinator on the part of the railroads that it had become apparent that the amended joint resolution reported by the committee on interstate commerce, providing for a continuance of the office for another year but without reference to co-ordination or power to issue orders, could not get

through either the Senate or the House at such a late time in the session.

"Not only did the railroad executives oppose it," he said, "but the labor organizations opposed it, notwithstanding the fact that there is no provision in it of any kind or character that would in any wise affect labor." (The amended resolution had been amended to refer only to "reduction of transportation costs" in place of the provisions in the emergency transportation act relating to avoidance of "unnecessary duplication of services and facilities" and to the "joint use of trackage.")

"They oppose it," he said, "because when they entered into an agreement with the railroads with reference to being laid off in the event of consolidations, there was a tacit agreement between the railroads and their employees that the employees would oppose a continuance of the co-ordinator's office even for the purpose of having future investigations made. The joint resolution I am offering, however, does not even permit the co-ordinator to make any further investigations. It merely provides for a continuance of the co-ordinator's office for a period of 90 days, with a view of closing up the business on hand and returning to the railroads the money which has been paid in, and which has not been used by the co-ordinator."

A number of transportation bills, many of which had been the subject of hearings and much controversy, failed of enactment and are now dead, until or unless they are re-introduced in the next Congress. These include the Pettengill long-and-short-haul bill, passed by the House but not by the Senate, the two labor bills passed by the Senate, the short-routing bill recommended by Co-ordinator Eastman and the Interstate Commerce Commission, passed by the Senate but not by the House, and the bill for the regulation of water transportation, reported favorably by the Senate committee but not taken up in the Senate. Of the series of bills proposed by the Railway Labor Executives' Association, including the six-hour day, train-limit, full-crew, and hours of service bills, four were reported by the Senate committee but none was passed.

The project for the continuation of work on the Florida ship canal with work-relief funds was finally shelved in the closing hours of the session when the House refused to accept a Senate amendment to the relief appropriation bill which would have authorized the President to allot $10,000,000 for additional work on the canal if a favorable report were made on it by a special board of engineers to be appointed by the President to report by July 20.

Both the House and the Senate passed a bill providing for a retirement insurance system for employees of the Alaska Railroad.

The ship subsidy bill, passed on June 20, authorizes the President, after two years, to transfer by executive order to the Interstate Commerce Commission any or all of the regulatory powers, duties, and functions of the proposed United States Maritime Commission, which is to take over the present functions of the Shipping Board Bureau of the Department of Commerce

Eastern Car Foreman's Association Outing July 23

The Eastern Car Foreman's Association will hold its annual golf tournament and field outing on Thursday, July 23, at the Race Brook Country Club, New Haven, Conn.

S. W. Claim Agents

The Southwestern Railway Claim Agents' Association is to hold its twenty-second annual meeting at the Roosevelt Hotel, New Orleans, La., on July 9, 10 and 11. The secretary is F. D. Wilkins, 601 Young Street, Dallas, Texas.

Record for C. & O. Docks

The Chesapeake & Ohio's Presque Isle docks at Toledo, Ohio, set a new record recently when 1,640 cars with approximately 90,000 tons of coal were dumped in a 24-hour period. The previous record was set on June 7 when 1,515 carloads went over the docks into vessels.

National Railway Historical Society

The Philadelphia chapter of the National Railway Historical Society is sponsoring for Sunday, July 12, a field trip over the Pennsylvania. The route of the trip will be over several of the road's branch lines and to Enola, Pa., where one of its large classification yards is located. At the Society's last meeting Robert G. Lewis of the Personnel Department of the Pennsylvania was elected third vice-president.

Twilight Limited on 4¾ Hour Schedule

The Michigan Central, on June 24, reduced the running time of its Twilight Limited between Chicago and Detroit 15 min., thereby placing the train on a schedule of 4¾ hr. for the 283.4 mi., an average of 59.7 m.p.h. The train now leaves Chicago at 4:15 p.m. instead of 4:30 and arrives in Detroit at 10:00 p.m. instead of 10:30; while returning it leaves Detroit at 4:45 p.m. instead of 4:40 and arrives in Chicago at 8:30 p.m. instead of 8:40.

W. H. Winterrowd Honored

The honorary degree of Doctor of Engineering was conferred upon William H. Winterrowd, vice-president of the Franklin Railway Supply Company, by Purdue University at its recent commencement. Mr. Winterrowd was graduated from that institution in 1903 with the degree of bachelor of science in mechanical engineering. The citation for his honorary degree read: "Engineer of high repute, executive of recognized achievements, humanist of inspiring example."

New York-New Orleans Train Expedited

Expedited service between New York and, New Orleans, La., via Atlanta, Ga., became effective on June 21 when more than one hour was cut from the schedule of the southbound Piedmont operating over the Pennsylvania and Southern. This train now leaves New York at 9:50 p.m., Eastern Standard Time, and arrives in New Orleans on the second morning at 7:45 Central Standard Time. The northbound schedule of the Piedmont has also been improved with that train now leaving New Orleans one and one-half hours later and arriving in New York at the same time as before.

The New York-Atlanta schedule of train No. 29 operating over the Pennsylvania and Southern has also been shortened by approximately two hours. This train now leaves New York at 7:30 p.m. instead of 10:05 p.m. and arrives in Atlanta at 3:30 p.m. the following day instead of 8:10 p.m.

Club Meeting

M. A. Myers, general freight agent of the Canton, has been elected president of the Traffic Club Forum, the educational branch of the Traffic Club of Baltimore. Ludlow H. Baldwin, president of the Terminal Warehouse Company, has been elected vice-president and Albert Lee Sherry, freight representative of the Baltimore & Ohio, secretary. The Traffic Club of Baltimore held its annual outing on June 16 at Bay Ridge, Md., on Chesapeake Bay, while its fourth annual moonlight cruise will be held on August 3.

Emergency Board Recommends Adjustment of W. P. Dispute

The emergency board appointed by the President on May 21 to investigate disputes between the Western Pacific, the Sacramento Northern and the Tidewater Southern and their train service employees, who had taken a strike vote, has submitted a report taking up the various disputes and expressing the belief that the cases can and should be adjusted under the processes of the railway labor act by reference to the National Mediation Board and the National Railroad Adjustment Board.

Safety Meeting Held at Chicago

More than 350 representatives of the railroads attended the sixteenth annual meeting of the safety section of the Association of American Railroads held at Chicago on June 23-25. Besides the reports of committees the program included addresses by J. M. Symes, vice-president of the A.A.R.; W. H. Cameron, managing director of the National Safety Council; W. J. Patterson, director of the bureau of safety of the Interstate Commerce Commission; Elmer T. Howson, vice-president and western editor of the *Railway Age*, and Lew R. Palmer, conservation engineer of the Equitable Life Assurance Society.

Pacific Northwest Shippers' Board

The Pacific Northwest Shippers' advisory board held its thirty-third regular meeting at Yakima, Wash., on June 19, with an attendance of approximately 500. Reports of commodity committees indicate an increase of 3.8 per cent in revenue carloadings during the third quarter as compared with the same period of last year. Increases in shipments anticipated are: 6.7 per cent in construction and building materials; 13.9 per cent in products of mines; 1.7 per cent in animals and prod-

ucts and 5.5 per cent in manufactured and miscellaneous items. George C. Manning, assistant vice-president of traffic of the Erie, and president of the New York Traffic Club, was the guest speaker at a luncheon.

I. C. C. Hears Arguments on Rail-Truck Joint Rates

Oral arguments were heard by the full membership of the Interstate Commerce Commission on June 17 on the question of whether it should vacate its order suspending tariffs filed by the Keeshin Motor Express Company providing for joint rail and motor rates between eastern and western points via the Chicago Great Western. B. F. Parsons, freight traffic manager of the Chicago Great Western, and Luther M. Walter, trustee of the C. G. W. and also counsel for the Keeshin company, urged the commission to allow the tariffs to go into effect, as offering an experiment in voluntary co-ordination of rail and highway service and an opportunity to add more than $1,000,000 a year to the revenues of the railroad. They took the position that if the joint rates are not allowed, the only result would be that the traffic would continue to move by highway at approximately the same rates. Counsel for other eastern and western railroads opposed the tariffs on the ground that they would destroy the rail rate structure and enable the truck interests to offer the line-haul business to the lowest bidder among the railroads that would perform the intermediate haul.

Great Northern Goat Given New Stance

The goat in the Great Northern trade-mark has been given a new stance and outward appearance. "For some years," according to the railroad, "there has been a growing suspicion in the railroad's innermost circles that its goat wasn't all it should be. Persons who claim to speak with authority have intimated that the trade-mark was a cross between a Billy and several other animals of the ordinary barnyard variety, and that the chap who drew it had never studied one of these regal animals in its natural habitat. These, and other considerations, caused the advertising department of the Great Northern to take the proper steps to render unto the mountain goat its just dues. The result is a new goat. It will be some time, however, before the transfiguration is complete, for the old goat is imprinted on more than 50,000 freight cars moving all over the United States, on 1,000 locomotives and diverse other objects, including water tanks, bridges and stations, to say nothing of a few million pieces of literature."

Uniform Railway Nomenclature

The establishment of a uniform railway merchandise nomenclature and the compilation of a dictionary of technical railway traffic terms are the two subjects now most prominently before the International Chamber of Commerce's Committee on International Railway Traffic Nomenclature, according to reports following a recent meeting of the committee in Paris. The committee hopes to compile a list of the principal commodities entering into international railway traffic, which list will be published in English, French, German and Italian in an endeavor to provide consignors and railways with a convenient reference book, accurate as to equivalent terms. The aim of the proposed dictionary of traffic terms is to publish definitions of the exact meaning given by each country to its own terms.

25,748 Freight Cars on Order June 1

Class I railroads of the United States had more new freight cars on order on June 1, last, than they have had on this date since 1930, according to the Association of American Railroads. New freight cars on order on June 1 totaled 25,748, compared with 1,479 cars on June 1, 1935; 20,011 cars on June 1, 1934, and 30,680 on June 1, 1930. On May 1, last, there were 18,467 cars on order in shops throughout the country. New steam locomotives on order on June 1 totaled 58, and new electric and Diesel locomotives 30, compared with 10 steam locomotives and 37 electrics and Diesel on order a year ago, and 40 steam and 107 electric and Diesel locomotives on order June 1, 1934.

New freight cars placed in service from January 1 to May 31, this year, aggregated 8,948, compared with 1,294 in the corresponding period of 1935, and 2,327 cars in the same period of 1934. In the first five months of this year 9 steam and 8 electric and Diesel locomotives were installed in service, as against 20 steam and 55 electric and Diesel locomotives in the corresponding period of 1935 and 1 steam and 6 electrics and Diesel in the same period of 1934.

C. N. R. Trustee Ouster Passed

Despite a declaration by Senator the Rt. Hon. Arthur Meighen, Conservative leader, and several of his associates in the Canadian Senate that they would oppose, the bill already passed by the House of Commons restoring the directorate system on the Canadian National was adopted last Friday night at Ottawa without a record vote.

The effect of the legislation will be to remove the three trustees of the C. N. R. and replace them by a board of seven directors, leaving the operations of the road in the hands of President S. J. Hungerford as at present. The trustees are former Judge C. P. Fullerton, F. K. Morrow and J. E. Labelle. Mr. Fullerton was asked to resign as soon as the present Liberal Government took office last October but refused to do so. The board of trustees was appointed in 1933 and took office January 1, 1934.

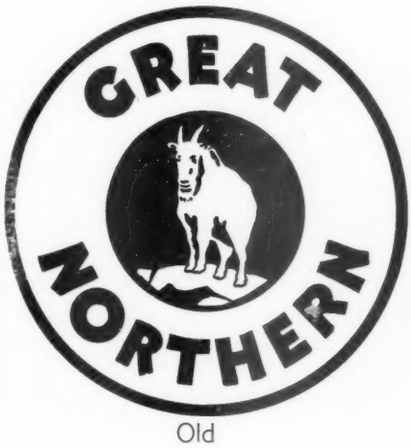
Dedication Ceremonies for "City of Denver"

Dedicatory ceremonies for the streamliner "City of Denver," placed in service by the Union Pacific on June 18, were held in Chicago and Denver. The ceremonies in Chicago took place in the Chicago & North Western station between 4:30 p.m. and 5:00 p.m., eastern time, while those in Denver were held simultaneously at the Union station in that city. Fred W. Sargent, president of the North Western, introduced Edward J. Kelly, mayor of Chicago, who spoke, and Fredrica Sargent, daughter of the president, christened the train. F. W. Robinson, vice-president of the Union Pacific, and an NBC musical group were also on the program. At Denver, W. A. Harriman, chairman of the board of the Union Pacific, Carl Gray, president, and Mayor Stapleton of Denver, were featured with the KOA quartette. Miss Johnson, daughter of the governor of Colorado, christened the second of the two trains. The ceremonies at both cities were broadcast over the National Broadcasting Company radio network.

N. Y. C. "Mercury" Christened

The New York Central's new streamlined train, the "Mercury," was christened at Union station, Indianapolis, Ind., on June 25 by Miss Louise Landman, daughter of L. W. Landman, general passenger traffic manager of the road. She broke over the nose of the "Mercury's" locomotive a bottle of champagne from Sandusky, Ohio, which is along the route the train will cover on its proposed regular run between Cleveland, Ohio, and Detroit, Mich., via Toledo, Ohio. The "Mercury" is expected to go into regular service on a daily round trip on July 15.

Prominent citizens and civic officials of Indianapolis and surrounding territory attended a private preview and the christening while a public exhibition followed the ceremonies. In the evening the "Mercury" started on a slow run to New York,



Old

New

where it will be exhibited in Grand Central Terminal on Sunday and Monday, June 28 and 29.

French Train Equipped with Address System

The Northern Railway of France has recently placed in service a train equipped with a public address system, according to reports received by the United States Department of Commerce. The train will be used primarily for excursion tours during the course of which announcements concerning points of interest along the route will be transmitted to the passengers. It was, however, recently chartered by a chemical company which, in transporting guests to its plant, utilized the time en-route to present technical explanations and other information.

The address system is controlled from the last car of the train which is equipped with a microphone and other apparatus for voice transmission. This system is connected with outlets installed in each of the train's other cars.

Double-Deck Trains in Germany

The Lübeck-Büchen railway in Germany has recently placed in service two two-car double-deck streamlined trains hauled by a 2-4-2 type tank locomotive. The new trains, says a description published in a recent issue of the Railway Gazette (London), are designed for a maximum speed of 74.6 m.p.h. and may be operated without shifting the locomotive from one end to the other; an operator's compartment has been built into the front of the car which leads when the train is running with the locomotive at the rear, and electric remote control apparatus is employed to operate the engine. The passenger seats on the double deck cars provide accommodations for 258 third class and 42 second class passengers. The light-weight cars, which are but little higher than those of normal design, are built of high-tensile steel and the framework is welded throughout; trucks are fitted with roller bearings.

More Reports Expected from Eastman's Office

Co-ordinator Eastman's organization, when the emergency transportation act expired on June 16, had four more reports or groups of reports nearly completed which he expected to find some means of completing and issuing in the near future. These include the group of reports on the subject of government subsidies to various forms of transportation, those on labor standards in water and highway transportation, the report on the short line problem, and a final report of the study of employment records made originally as the foundation for the formulation of pension legislation.

At a press conference after Congress had failed to provide for even a temporary continuation of the office Mr. Eastman said the railroads now have an opportunity to go ahead on their own momentum, one of the avowed purposes of the Association of American Railroads; that the obstacles created by the labor restrictions in the emergency act are now out of the way, and that they now have an agreement with the labor organizations which makes provision for employees affected by co-ordination projects. "I believe the things I have recommended are sound", he said, "and I have several times expressed the opinion that if the railroad industry is to be placed on a sound and prosperous basis for the future it will have to eliminate the waste resulting from the inability of the various companies to co-operate and co-ordinate more effectively."

President Roosevelt said on June 23 that he had asked the director of the budget to try to find a way to allot funds for the completion of the co-ordinator's reports. Some of them have been prepared in tentative form and distributed confidentially to representatives of the interests affected for criticisms or checking before being made final.

36 States Survey Highways as Basis for Road Programs

Highway planning surveys are now in progress or soon will begin in 36 states, according to the Bureau of Public Roads of the U. S. Department of Agriculture. The surveys are being conducted by the state highway departments with the co-operation of the bureau, for the purpose of supplying information to put future highway improvement on a sound, business-like basis. In the past attention has been centered on improving the main through highways. In the future more attention must be given, highway officials say, to improving secondary and feeder roads and to improving conditions where the main highways pour traffic into cities. At the same time the main highways must be maintained and further improved to meet needs that already exist, particularly as regards safety.

Federal highway officials who are coordinating the various state surveys think that a selection should be made of those roads that because of their importance merit early consideration in an improvement program. Future programs can be planned intelligently only with information as to which roads should be improved first. To determine this highway officials need definite facts as to traffic counts, construction costs, maintenance costs, how much taxes that can be fairly imposed for highway use, and where the taxes should be imposed from the viewpoint of highway usage. Information along these lines is being collected in each of the state surveys. Each survey has three branches—a highway condition survey, a highway traffic survey, and a highway finance survey.

The Bagdad Railway

The railway from Istanbul to Bagdad, partly completed by Germany before the close of the World War, is now to be finished, according to a London dispatch in the New York Times, and the gossips are busy with pictures in their minds of trains running to Nineveh and (almost) to the Garden of Eden. The line of the railway lies through Mosul, which is just across the Tigris from the two great mounds which mark the site of Nineveh. This is in the center of the one gap which remains in the whole 1,600 miles of the railway. The length of the unfinished portion is about 290 miles, mostly through the flat lands of northern Iraq. The line from Istanbul (now in use) crosses the high plateau of Asia Minor, by means of innumerable tunnels through the Taurus mountains. The present eastern terminus is at Nisibin, 1,100 miles from Istanbul, and motor buses carry travelers from that point by way of Mosul to Baiji on the Tigris, which is about 160 miles short of Bagdad.

The British Oil Development Company is said to have tapped a rich oil field, and that is the reason for the present enterprise, the oil being too "heavy" to be sent to the Mediterranean through the existing pipe line. The Iraq government stipulates that the new line must fill the whole of the gap, which necessitates building considerably beyond the oil fields. It is expected to complete the new construction within three years, there being no serious engineering difficulties.

The former German ownership of the Bagdad Railway has been broken up and is now shared among the Turks, the French, in Syria, and the Iraq government.

Plans for passenger traffic have not been settled, but there is talk of a through sleeping car once a week from Paris to Cairo, Egypt, the Bosphorus being crossed by a car ferry. The scenery through Turkey is apparently of all sorts, beautiful, ordinary and below ordinary, the tunnels through the Taurus mountains numbering 55, the longest one three miles in length. According to the map accompanying the Times article, Aleppo is a short distance south of the Bagdad line, on the railway extending to Damascus and southward.

L. I. Still Charging Three Cents Per Mile for Intrastate Tickets

The Long Island continues to charge three cents per mile for intrastate tickets, having this week won a conditional stay of the recently-issued injunction restraining it from charging more than two cents per mile to passengers traveling within the limits of New York City. The injunction, granted by the Supreme Court of Kings County upon petition of the New York Transit Commission, which has regulatory jurisdiction in New York City, and upheld by the Supreme Court's Appellate Division, was stayed by Chief Judge Crane, of the New York Court of Appeals, pending prosecution of the road's appeal before that court.

The Transit Commission's petition is based on Section 57a of the New York railroad law, which prohibits a railroad operating within New York City and owned by another carrier from charging a higher rate for passenger service within that city than the parent railroad charges outside. The Pennsylvania's two-cents-per-mile coach rate brings the Long Island within the provisions of this law, which the latter alleges is unconstitutional.

The stay was granted upon condition that the road issue to every person purchasing transportation between stations within New York City, at a rate per ride

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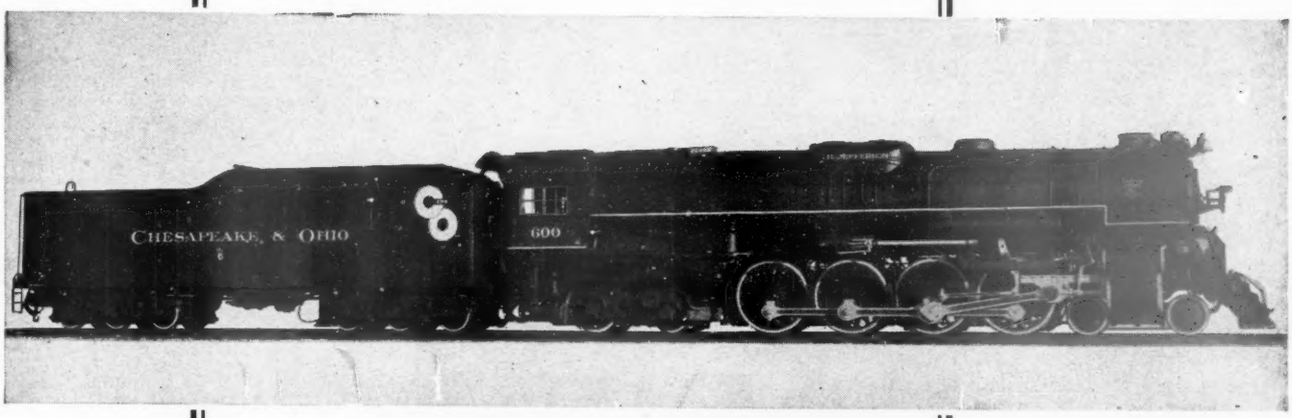


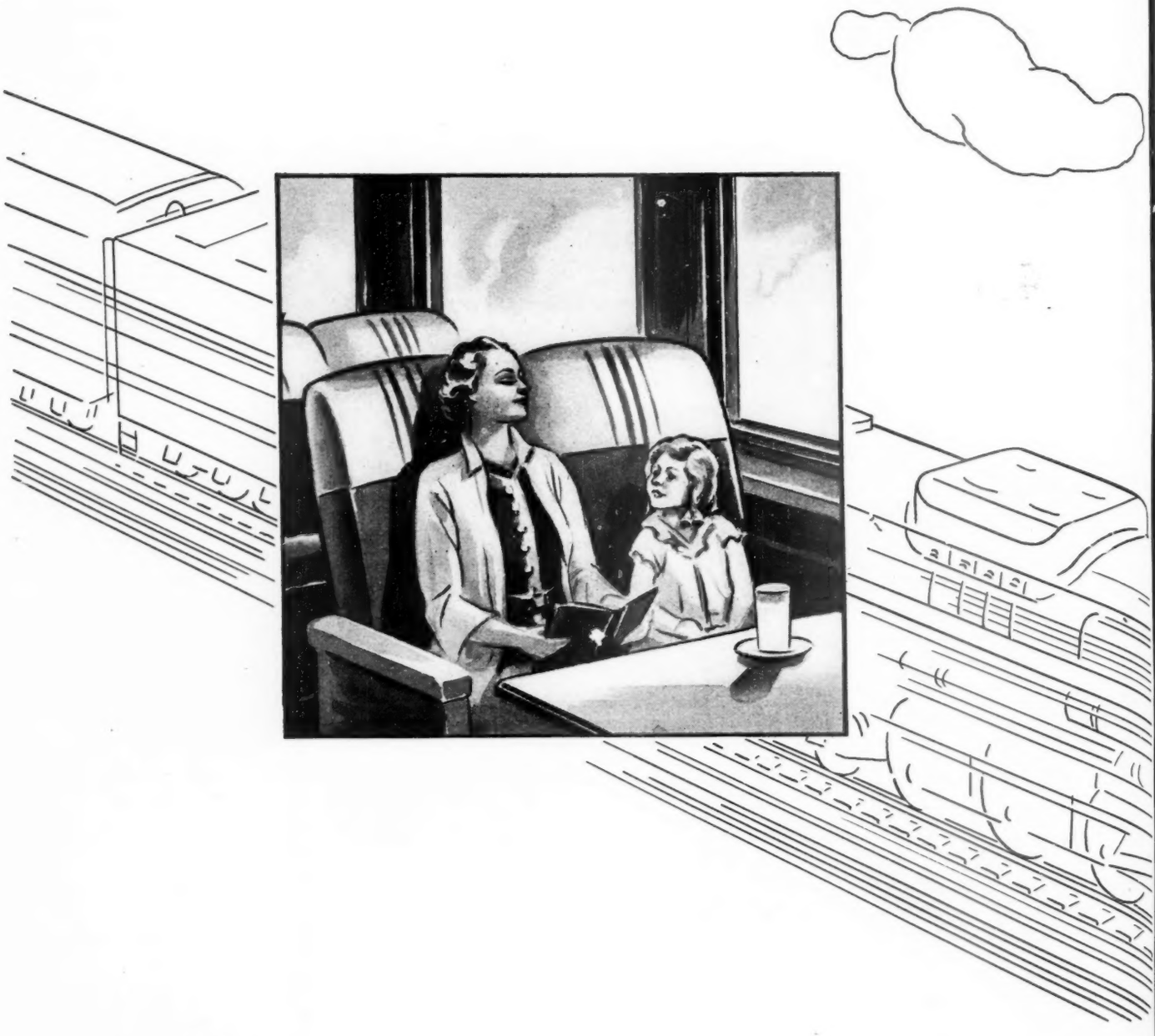
Performance and economy of operation of the five Greenbrier Type Locomotives which were placed in passenger train service in January of this year by the Chesapeake and Ohio Railway Company are daily demonstrating the foresight of the management.

• MODERN POWER •
MAKES THE RAILROAD

LIMA LOCOMOTIVE WORKS, INCORPORATED, LIMA, OHIO

LIMA
LOCOMOTIVE WORKS
INCORPORATED

THERE IS *Real*
WITH BOOSTER

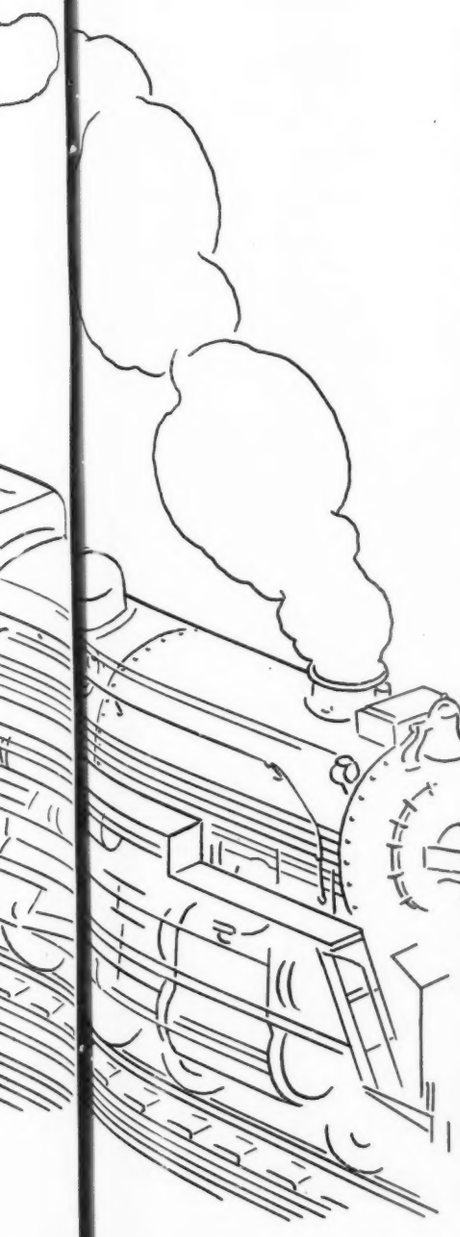


REG. U.S. PAT. OFF.

FRANKLIN RAILWAY
NEW YORK

Travel Comfort

HANDLED TRAINS . . . . .



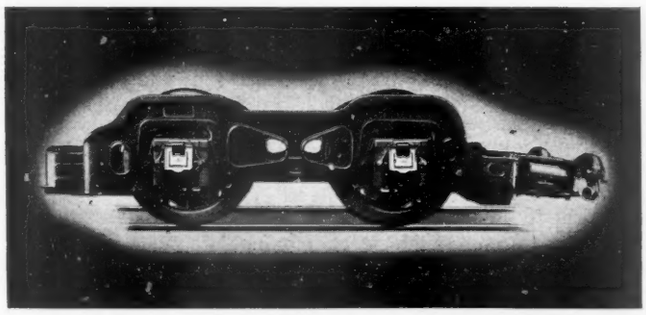
Air conditioning and other luxurious appointments provide but half the needs for passenger comfort.

Smooth handling over the road is even more important—rough, jerky starting spoils any travel luxury you can provide.

For smooth, quick handling, the extra power The Locomotive Booster provides is a necessity. It avoids the jars and jerks which irritate. It acts as the low gear in the automobile.

By eliminating discomfort in starting, the Booster enhances and capitalizes all other improvements.

In any budget for air conditioning, be sure The Locomotive Booster is included.



Y SUPPLY COMPANY, INC.
CHICAGO MONTREAL

in excess of two cents per mile, a coupon, redeemable at any ticket office of the road, for the difference between the fare paid and the rate required by Section 57a of the railroad law, in the event the validity of the statute or of the rate provided therein is finally sustained, and upon the further conditions that, pending the issuance of said coupons not later than June 30, the road shall return to each purchaser of such transportation his cancelled ticket, which may be used as a refund coupon, the purchaser to receive a printed notice similar in form to the coupon, and that the road make adequate and suitable provisions for the redemption of such coupons.

Meanwhile the New York Public Service Commission, having regulatory jurisdiction outside New York City, has issued an order, effective July 1, requiring the Long Island to reduce its fares for intrastate travel outside New York City to two cents per mile. The road has as yet made no move to contest this order.

To Show Railroad Tax and Payroll Contributions

In order to show the taxpayers of Illinois the immediate effect on their own taxes and the terrific blow to payrolls and employment in the state if the railroads should be forced into governmental hands or otherwise curtailed in their activity as a private enterprise, the Illinois Chamber of Commerce on June 22 began a survey designed to show the taxes paid, payrolls, employment and other contributions made by the railroads in every county of the state. The survey is expected to be completed early in July in time for use during Railroad Week, July 13 to 18.

The state chamber hopes to provide every one of the nearly two hundred local chambers of commerce in Illinois with a local application of the railroad contribution. It hopes to prove that the taxpayers have too much of a selfish interest at stake to sit idly by and approve restrictive legislation and the menace of red tape bureaucracy. Its announced purpose is to prove to the citizens that the railroads of Illinois are really a Santa Claus, paying well over $25,000,000 in taxes which private citizens would have to shoulder in the event the railroads were not able to pay. Plans now call for the presentation of these local facts to the citizens of many of the more important Illinois cities through the holding of "Railroad Meetings" in conjunction with Railroad Week.

"Forgetting for the moment the tremendous contribution of the railroads in buying power, wages paid and employment given," stated C. G. Ferris, executive vice-president of the Illinois Chamber of Commerce, "we can find sufficient food for serious thought in the fact that nearly half of the tax bill paid by the railroads in Illinois goes for school purposes. In other words, the railroads are educating about one out of every ten students in Illinois today. Who will educate them if the railroads cannot remain in business or make sufficient revenue to pay the taxes?

"Taxpayers perhaps do not realize that the railroads also pay nearly three million of dollars to maintain highways and that the $12,000,000 left over, according to 1931 figures, was spent for highly needed governmental functions that will have to be maintained. We want to point out to every citizen—and base the figures on the contribution in his own county—that somebody is going to have to educate over 100,000 school children and put up over $25,000,000 in taxes if these same citizens refuse to demand sensible legislation and fair competition with respect to the railroads."

Efforts are being made not only to collect county by county figures on taxes, payroll and purchases, but also to obtain information as to the business given by the railroads to the important railway supply firms located in Illinois. These manufacturers, reports the State Chamber, employ thousands of men and pay thousands of dollars in taxes and wages on business almost entirely secured from the railroads of the country.

"The total, even localized into county figures," concludes Mr. Ferris, "is going to make a lot of citizens sit up and take notice. We are in sympathy with broad plans to educate people as to the comfort, speed, economy and dependability of modern rail transportation. But we do believe that the best way to win their support is on the selfish basis of actually showing them what they are going to have to pay —and what they are going to lose—if present trends for bureau managed railroads and for continuation of unfair competition are continued."

Van Sweringen Agrees to Co-operate in Senate Committee Investigation

After having received a written agreement from O. P. Van Sweringen regarding procedure to be followed by the various Van Sweringen companies in furnishing information called for by investigators for the Senate committee on interstate commerce in connection with its investigation of railroad financial matters, Senator Wheeler, chairman of the committee, on June 23 called off a proposed public hearing on the subject. Asserting that the companies had failed to co-operate fully with the investigators in furnishing desired information, Senator Wheeler had announced a hearing for June 22 and had called on Mr. Van Sweringen and other representatives of the companies to appear. Instead of holding a hearing, however, a series of conferences was held with Senator Wheeler, one of which was attended by Mr. Van Sweringen, and he announced on June 22 that a satisfactory agreement had been reached. He said that if the material asked for was not furnished promptly, or if any other railroad undertakes to delay the investigation by withholding or delaying information, subpoenas will be issued for a public hearing, and if the information is then withheld the matter will be turned over to the district attorney under a new law passed just before Congress adjourned regarding the inquisitorial powers of Congressional committees.

There are some 25 railroad systems on the list being investigated for the committee, the list having been selected by Coordinator Eastman in accordance with the Senate resolution authorizing the investigation. The work so far has been done by investigators working under the direction of Max Lowenthal, counsel for the committee, with much assistance from the Interstate Commerce Commission. Especial attention has been paid to the Van Sweringen and Pennsylvania companies, and Senator Wheeler said that it may not be necessary to go into all of the roads on the list because typical cases may furnish sufficient basis for the formulation of new legislation "to prevent abuses." No public hearings have yet been held by the committee, and Senator Wheeler said it was still uncertain as to whether they would be started this summer or fall.

C. N. R. Authorized to Build New Rouyn Line

Without a roll call either in the House of Commons or in the Senate the bill to authorize the building of a branch line of the Canadian National in the rich Rouyn mining area of northern Quebec was passed by parliament last week at Ottawa. The bill calls for a line about 99 miles long from Rouyn eastward and northward to Senneterre on the main National Transcontinental line, at a cost of about $5,500,000. An attempt was made in the Senate railway committee to reduce the estimated cost per mile from $60,000 to $45.000, but the motion was defeated.

About a month ago the Canadian Pacific went to the Quebec Legislature to get incorporation of a subsidiary company known as the Temiskaming & Abitibi Railway to get into the Rouyn mining area. The bill was approved by the railway committee after a hard fight but before the bill could be dealt with in the Quebec Legislative Assembly the Taschereau Cabinet resigned and the Assembly was dissolved. This left the C.P.R. project in the air.

After it was known the C.P.R. would make this move, even though the C.P.R. had begun and then abandoned a similar project about ten years ago, the Canadian National had introduced a bill in the House of Commons at Ottawa to extend or make a loop of its present line in that territory. It was approved in the House railway committee after little debate but when it was reported back to the House the Conservative leader, Rt. Hon. R. B. Bennett, suggested that since the C.P.R. line had fallen by the wayside, the Canadian National might drop its.

Mr. BENNETT: Well, under some circumstances the hon. gentleman, if we had his inmost thoughts, might say it was no fault of his. In view of what the minister said the other evening, that he did not intend to proceed with the project this year, now that this difficulty has been solved in the manner I have indicated, might it not be well to drop the measure?

To this suggestion, Hon. C. D. Howe, Minister of Railways, replied, "We made representations to Quebec that we intended to build this line, and I think we can hardly change our minds because the other bill failed to pass. Having committed ourselves to building it, I think it now becomes a matter of good faith."

Continued on second left-hand page

SECURITY ARCH SERVICE

Saves DOLLARS FOR YOU

Security Sectional Brick Arches are built upon a foundation of railroad experience and combustion knowledge combined with an adequate service of supply.

For many years locomotive combustion and its relation to Arch Brick has been the study of American Arch Company Engineers. Designs have been constantly improved and developed so that today the Security Arch performs more efficiently than ever before. Then too, during this time, the American Arch Company has perfected the "special service of supply" that assures proper quality and type of Security Brick promptly available at all points of consumption.

Measured in terms of fuel consumed the Security Sectional Arch is today one of the most effective of all fuel economy devices.

Measured in terms of thousands of ton miles the Security Arch renders greater service than it did when conditions were less severe.

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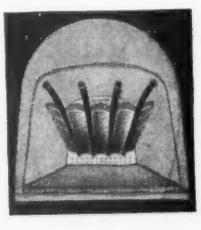

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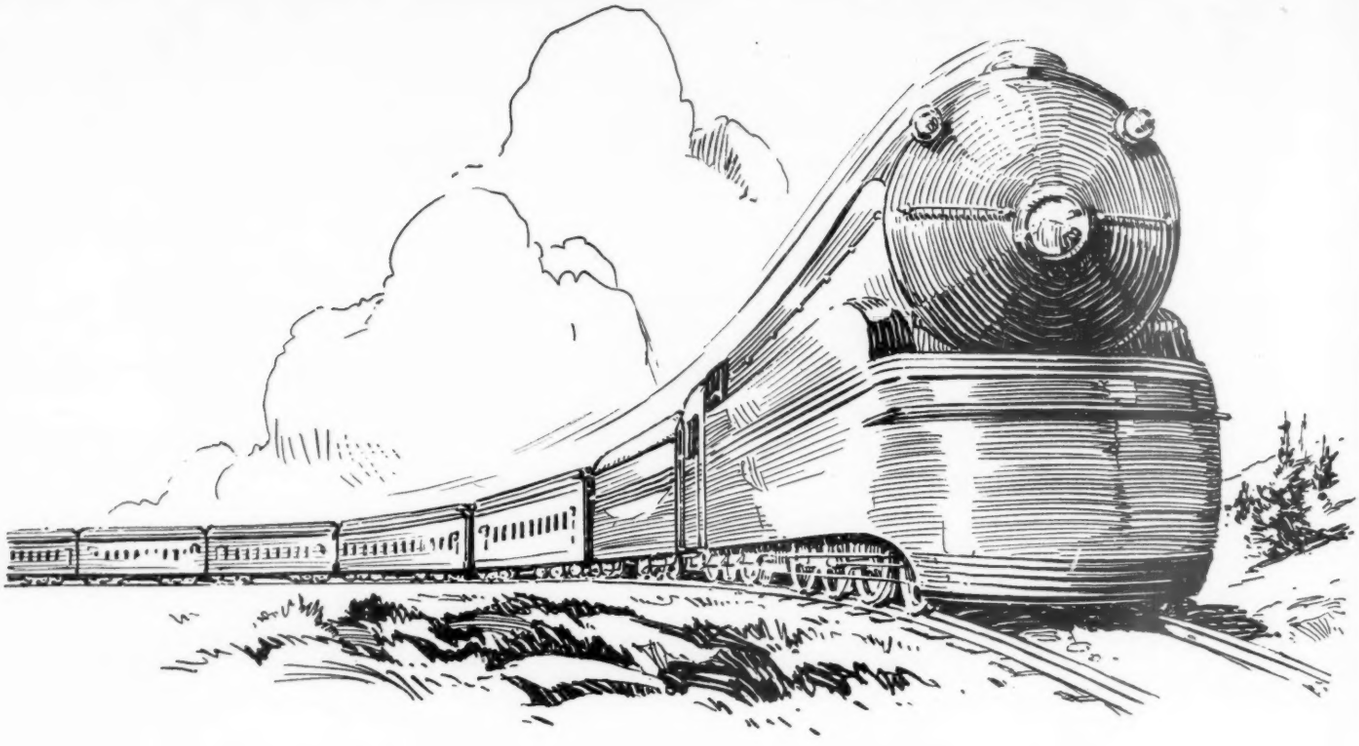
A Report on Loco



SUPERHEATED STEAM—While the advantages of high degrees of superheated steam, as commonly used on locomotives, are readily recognized by railroad mechanical men, the further advantages of steam at still higher degrees of superheat are not so well known.

Road tests disclosed that a $105,000 locomotive, equipped with a large tube superheater and developing 3500 horsepower, cost $30.00 per horsepower. Equipped with a type "E" superheater to provide higher degrees of superheat, this same locomotive developed 4250 horsepower. The extra 750 horsepower cost less than $5.00 per horsepower and the $30.00 figure was reduced to $24.70 for the total. For increased horsepower within limitations of weight and clearance, specify type "E" superheaters.

SUPERHEATER UNIT MAINTENANCE—After years of service, when superheater units become unfit for further use, they are often scrapped. In the majority of instances these unserviceable superheater units could have been reclaimed at our plant by remanufacture.

ELESCO

Superheaters
Feed Water Heaters
Exhaust Steam Injectors
Tangential Steam Dryers
Superheated Steam Pyrometers
American Throttles

motive Power Factors

Remanufactured units cost about half the price of new units although they provide about the same length and quality of service.

Many railroads have standardized on the Elesco remanufacturing service . . . as remanufactured superheater units are reprocessed by the same skilled workmen and special machinery as used in the manufacture of new units.

FEED WATER HEATING—The evaporative capacity of a locomotive is measured by the ability of its boiler to evaporate a certain amount of water within a given time. If the heating of the feed water from tender temperatures to near-steam temperatures can be done outside of the boiler, with heat from waste exhaust steam, the firing rate can be reduced proportionately, or the heat generated in the firebox can be used just to evaporate the *boiling* feed water . . . with a decided increase in the evaporative capacity of the locomotive.

Either one of the Elesco locomotive feed water heating systems will substantially increase the evaporative capacity of a locomotive and, in addition, will also reduce the back pressure on the cylinders and return a substantial amount of exhaust steam condensate to the tender to be used again as boiler feed water. This makes possible longer runs between water stops.

The closed type of Elesco feed water heater is composed of a rugged pump and a 4-pass heater which employs tubes of one size. This type of Elesco feed water heater accounts for a fuel and water saving of 12%-15%. There are more than 4000 of this type of Elesco feed water heater on locomotives in North America.

The Elesco exhaust steam injector, an open type of feed water heater, uses waste exhaust steam both to inject and preheat the boiler feed water, with a resultant fuel and water economy of 8%-12%. More than 20,000 of this type of injector are in operation on locomotives throughout the world.

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Equipment and Supplies

LOCOMOTIVES

THE MAINE CENTRAL expects to be in the market shortly for three Mountain type (4-8-2) locomotives.

THE SOUTHERN PACIFIC has ordered 6 high-speed passenger locomotives of the 4-8-4 type from the Lima Locomotive Works and 12 articulated freight locomotives of the 4-8-8-2 type from the Baldwin Locomotive Works. The tenders of all these locomotives will be equipped with Buckeye 6-wheel tender trucks. Inquiry for this equipment was reported in the *Railway Age* of May 16.

FREIGHT CARS

THE LEHIGH & NEW ENGLAND is inquiring for 250 hopper cars of 50 tons' capacity.

THE NEW ORLEANS, TEXAS & MEXICO, subsidiary of the Missouri Pacific, has been authorized by the United States District Court at St. Louis, Mo., to purchase 200 box cars.

THE MAINE CENTRAL expects to be in the market shortly for 500 box cars of 40 tons' capacity; 150 general service gondola cars of 50 tons' capacity and 150 hopper cars of 70 tons' capacity.

THE WHEELING & LAKE ERIE has ordered 1,000 twin hopper cars of 60 tons' capacity—500 from the Pullman-Standard Car Manufacturing Company, and 500 from the Ralston Steel Car Company. Inquiry for this equipment was reported in the *Railway Age* of June 20.

THE SOUTHERN PACIFIC has placed orders for 2,800 freight cars as follows:

No.	Type	Builder
250	Auto-Box	Mt. Vernon Car Mfg. Co.
500	Auto-Box	General American Trans. Corp.
500	Box	Pressed Steel Car Co.
500	Box	Pullman-Standard Car Mfg. Co.
500	Box	Bethlehem Steel Co.
250	Box	American Car & Fdy. Co.
200	Flat	Company Shops
100	Gondola	Company Shops

Inquiry for this equipment was reported in the *Railway Age* of May 9.

PASSENGER CARS

THE SOUTHERN PACIFIC, reported in the *Railway Age* of May 23 as inquiring for 20 baggage-horse cars, 80 ft. long, has ordered this equipment from the St. Louis Car Company.

AIR CONDITIONING

THE LOUISVILLE & NASHVILLE is completing the air conditioning of 39 coaches, 30 of which will be used on trains between New Orleans, La., and Cincinnati, Ohio, while the remainder will be used on the Dixie Flyer, the Southland and the Dixie Limited, operating between Chicago and southern points.

Supply Trade

Cutler-Hammer, Inc., Milwaukee, Wis., has moved its Los Angeles, Cal., sales office to 1331 Santa Fe avenue. This office is in charge of **W. G. Tapping.**

The Electric Storage Battery Company, Philadelphia, Pa., has moved its Minneapolis, Minn., office from 3 North Fifteenth street, to 617 Washington avenue, North.

William P. Ewing, vice-president in charge of sales of the **Superior Steel Corporation,** Pittsburgh, Pa., has been promoted to executive vice-president, a newly created office, and has been succeeded by **L. W. Briggs,** who has resigned as general manager of sales of the West Leechburg Steel Company. **David Pryde,** manager of works of the Superior Steel Corporation, has been promoted to vice-president in charge of operations.

The following personnel changes in **The Safety Car Heating & Lighting Company,** New York, become effective as of July 1: **Charles W. Walton,** for 23 years secretary and treasurer of the company, at his own request relinquishes the responsibilities of those positions and after 35 years of continuous service to the company he retires from active business. **Herbert K. Williams,** assistant to president, has in addition been elected secretary of the company, his headquarters remaining in New York. **William Stewart,** assistant secretary and assistant treasurer has been elected treasurer and assistant secretary with headquarters remaining at New Haven, Conn. **John H. Michaeli,** formerly assistant to vice-president of Safety Refrigeration, Inc., a subsidiary of Safety Car Heating & Lighting Company, has been elected assistant secretary and assistant treasurer, with headquarters in New York. In addition to the above corporate changes, the following also become effective July 1: **H. D. Donnell,** representative at San Francisco, Cal., has been appointed manager of the Pacific Coast sales district with headquarters remaining at San Francisco. **Joseph E. Haskett,** who has been attached to the headquarters staff in New York, has been transferred to the Pacific Coast sales district with headquarters at San Francisco. **Arthur R. Hamilton,** representative in the Chicago sales district is transferred to New York as assistant to Mr. Williams, and **Eugene Leherissey,** formerly connected with the engineering and inspection department at the New Haven Works transferred to the Chicago sales district, with headquarters at Chicago.

American Car & Foundry Company Annual Report

The American Car & Foundry Company for the fiscal year ended April 30, 1936, reported a net loss after all charges of $582,515, as compared with a 1934-35 net loss of $1,968,514. In the figures for each of the two years there is a charge of approximately $1,600,000 for depreciation.

The report calls attention to the fact that the company maintains an exceptionally strong liquid position—"with neither funded debt nor bank loans, with current assets largely in excess of current liabilities, with a substantial surplus and with resources by way of cash and securities sufficient to supply its need of working capital."

In commenting upon the outlook in equipment markets, President Charles J. Hardy points out how equipment buying during the past year has been better in volume than during the three or four preceding years. He adds, however, that the buying has been "sporadic and irregular in its movement. There has not been that constant flow and even distribution of buying orders that is essential to the complete absorption of overhead charges—while, at the same time, it is necessary to keep plants and personnel always prepared to undertake whatever business might be offered, and to do so whenever the offer comes." Mr. Hardy feels, however, that railroad executives recognize the need for equipment of modern design and that their problem "has been, and is, that of financing the purchase of the needed equipment." Thus, he adds that the return to "at least moderately prosperous times" justifies the prediction that "in the near future there will be a resumption of sustained activity in the field of industry in which your company is engaged."

Mr. Hardy also comments on the coming presidential campaign—a contest which he says "promises to be an exciting one," although he does not predict the effect of the outcome on industry. He feels that the new tax law, the enactment of which he anticipated, is of more immediate concern and that "it is certain that the burden of taxation imposed upon corporations, already great under both Federal and State legislation, will be largely increased." He sees no immediate prospect of escape from this.

OBITUARY

Frederick W. Stubbs, who was mechanical engineer of the Chicago Great Western from 1911 to 1923, died on May 16 at Muncie, Ind. From 1923 to 1926 Mr. Stubbs served as mechanical engineer of the Standard Stoker Company, and later was connected with the A. M. Byers Company. At the time of his death he was mechanical engineer of the Muncie Oil Engine Company, Muncie.

TRADE PUBLICATIONS

RUBBER CUSHIONS.—Under the title "Mishawaka Cushions," the Mishawaka Rubber & Woolen Manufacturing Company, Mishawaka, Ind., has recently put out a 20-page booklet describing the cellular rubber cushions which are now being produced by this company. The entirely new type of cushion described in the booklet is a vulcanized rubber foam, made from liquid latex or cellular foam rubber. The adaptability of this material to all types of seating requirements is pointed out in the booklet, which describes how the seats are made, lists their advantages and illustrates some of the more important of the different shapes which have already

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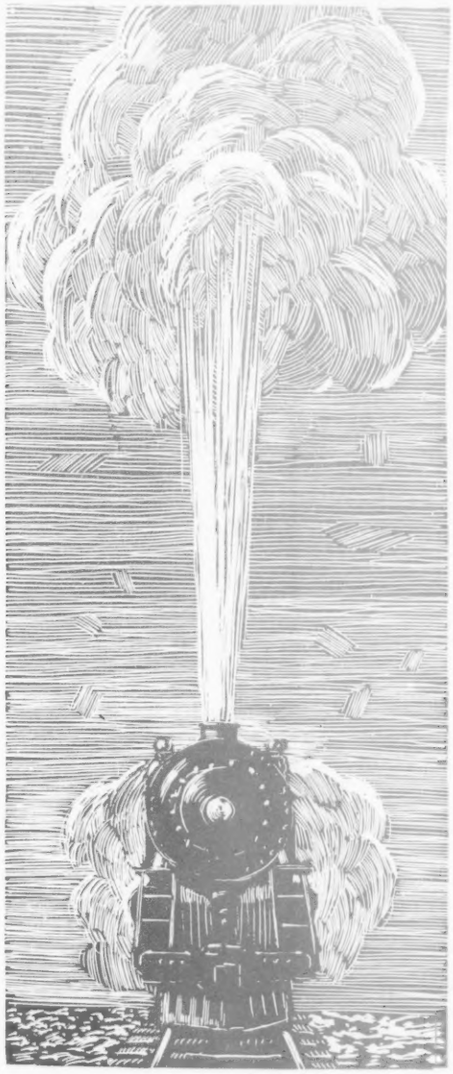
More Corroboration



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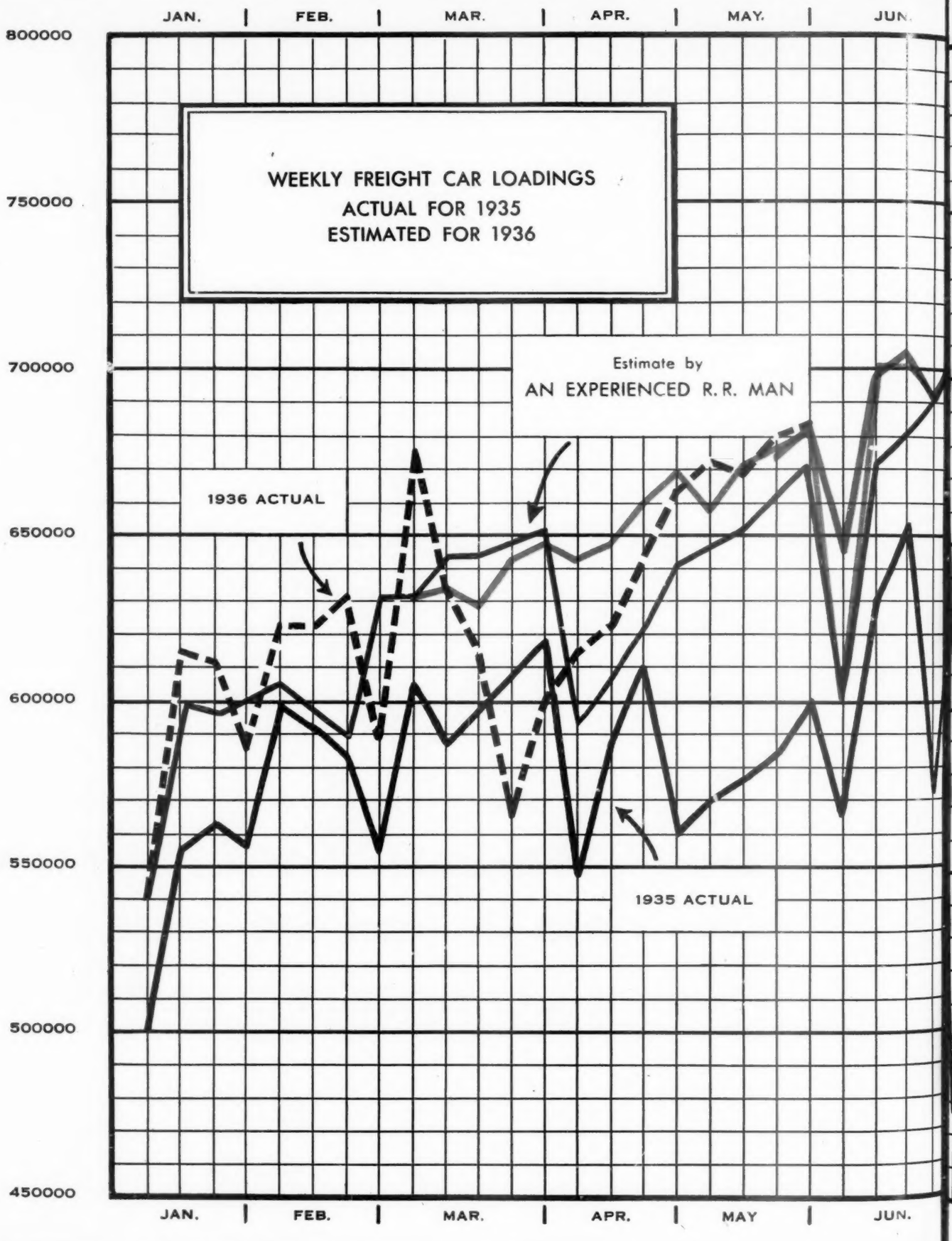

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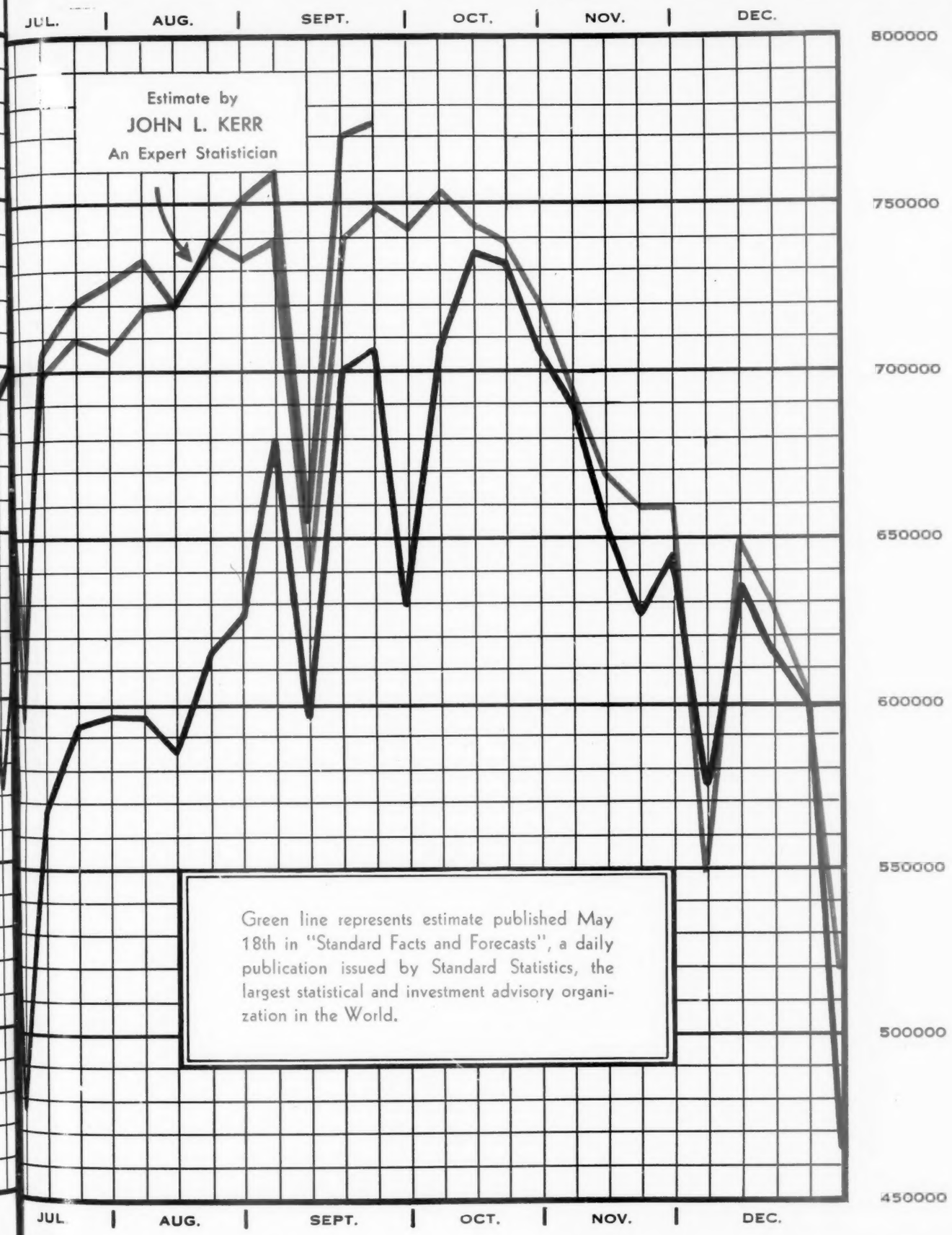
VOTIVE COMPANY



NEW YORK N·Y·

been made and placed in use. The interesting test machines used to demonstrate the durability, flexibility and pressure resistance of the rubber cushion material are illustrated.

THE HOUSE OF GOODYEAR.—This 413-page book by Hugh Allen is a history of the Goodyear Tire & Rubber Company. While tracing in comprehensive fashion the development of that business house, it includes "significant chapters" on the world-wide ramifications of rubber, new trends in merchandising, chain stores, competition, government regulation, and labor and industrial relations; also, a chapter on aeronautics. The book, priced at $1 per copy, is available through the Goodyear advertising department, Akron, Ohio, and Los Angeles, Calif.

Construction

CENTRAL VERMONT.—A contract has been given to the O. W. Miller Company, Inc., Springfield, Mass., for masonry work, and to the American Bridge Company for structural steel (550 tons) in connection with the replacement of three 171-ft. deck trusses over the Connecticut river at Northfield, Mass., which were taken out by the flood of last March. The masonry work will cost about $50,000 and the structural steel and miscellaneous work about $125,000.

NEW YORK CENTRAL-ERIE.—The New York Public Service Commission has adopted an order amending a general plan for the elimination of the grade crossings of these roads in Dunkirk, N. Y. The order provides for the elimination of the New York Central crossings at 14 streets and the lengthwise occupation of the tracks in Third street; also for the elimination of the Erie crossings at six streets and lengthwise occupation of tracks in Third street. The crossings are to be eliminated by closing certain streets across the railroads and by placing the grade of the railroads above the grades of certain other streets. The order requires the New York Central to prepare the plans, specifications and estimates of cost for the project and to perform all the work authorized.

PERE MARQUETTE.—A contract has been awarded to the Jutton-Kelly Company, Detroit, Mich., for the reconstruction of this company's bridge over the Cheboyganing river near Bay City, Mich., at a cost of about $25,000. A contract has been awarded to the Gale Service & Construction Company, Chicago, for the construction of pump house, treating plant, two miles of water supply line and other water service facilities a short distance north of Toledo, Ohio, to serve the engine and yard terminal near Erie, Mich. This work will cost about $35,000.

TEXAS & PACIFIC.—Bids have been requested for the work of constructing the substructure of a drawbridge to replace an existing structure at Grosse Tete, La. This project will involve an expenditure of about $90,000.

Financial

ALABAMA GREAT SOUTHERN.— *Dividend.*—Directors have declared a dividend of $1.50 on the ordinary stock of record June 22, payable July 15. The last previous disbursement, $2, was made in December, 1934. The Southern owns 92,111 of these shares ($50 par).

CANTON & CARTHAGE.—*Abandonment.*—This company has applied to the Interstate Commerce Commission for authority to abandon its logging road from Pelahatchie, Miss., to Sand Hill, 13.75 miles.

GREAT NORTHERN.—*R.F.C. Sells Secured Notes.*—The Reconstruction Finance Corporation on June 18 received seven bids for an issue of $4,935,000 of this company's 4 per cent secured serial bonds, and awarded the issue to the highest bidder, Halsey, Stuart & Co., New York, for $5,158,407, a premium of $223,407, the unit price being $1,045.27 per thousand. The purchasers have offered the issue publicly at interest rates varying from 0.35 to 3.25 per cent, depending on maturity dates, which fall between 1936 and 1944.

LEHIGH VALLEY.—*Abandonment.*—The Interstate Commerce Commission has authorized this company to abandon a branch line extending from Bear Creek Junction, Pa., northeasterly to Beaupland, 11.3 miles.

LOUISVILLE & NASHVILLE.—*Bonds.*—This company has applied to the Interstate Commerce Commission for authority to procure the authentication and delivery of $30,000,000 of Series E 3¾ per cent first and refunding mortgage bonds, to be exchanged for a like amount of 4½ per cent bonds in the treasury, and to sell $26,000,000 of the new bonds. Morgan, Stanley and Co. subject to the approval of the Interstate Commerce Commission, have offered this $26,000,000 issue, maturing 2003, priced at 98. The proceeds will be used, together with treasury funds, to redeem $3,500,000 St. Louis division first mortgage 6's due 1971 at 107; $10,000,000 of secured 5's due 1941 at 103; and $12,753,000 of first and refunding 5½'s due 2003 at 102.

LUDINGTON & NORTHERN.—*Abandonment.*—This company has applied to the Interstate Commerce Commission for authority to abandon its line of 6.26 miles in the vicinity of Ludington, Mich.

MINNEAPOLIS & ST. LOUIS:—*Dismemberment Hearings.*—L. R. Bitney, statistician of the Minnesota Railroad and Warehouse Commission testified that when business and agriculture in the Northwest get back to the level of normal prosperity, the M. & St. L. will receive gross revenues of $10,000,000 or more a year and from this will produce a net operating income of around $750,000. He also stressed two points for the I. C. C. to consider in connection with the dismemberment proposal. One was that the depressed situation of trade, industry and agriculture during the last six years has been the primary cause of the depleted traffic and revenues of the road. The other was an assertion that the property of the road really is worth more than appears on its books, since the M. & St. L., in common with most other rail carriers, has for years been charging off excessive amounts for depreciation each year.

Frank B. Townsend, director of the Minneapolis Traffic Association, testified that dismemberment of the M. & St. L. would destroy valuable traffic arteries vital to Minneapolis and the northwest. The railroad now presents a through route to Peoria, Ill., he said, which would be broken if the line were parcelled out as proposed. This line to Peoria, he contended, is one of the finest arteries to and from the east for Minneapolis and the northwest as goods can be routed to avoid Chicago with its high switching charges and delay in the handling of freight. Under the dismemberment plan, the 190 miles of M. & St. L. trackage between Peoria, Ill., and Oskaloosa, Iowa, would become a branch of the Chicago, Burlington & Quincy, which already maintains a parallel line. The M. & St. L. is a preferred route for the shipment of strawberries and melons from the south of Minneapolis and dismemberment would destroy this route, he maintained. It also has, in connection with the Wabash, a route to St. Louis, which would be destroyed, and other roads could not give the same service, he said. Abandonment of 550 miles of track of the M. & St. L., as proposed in the dismemberment plan, would damage Minneapolis as a grain market and wholesale distributing center, he testified. This damage would result from diversion to competing markets of grain and other commodities now shipped to and from Minnesota and Iowa communities over the M. & St. L., he said. He contended that under the dismemberment plan 51 elevators in Minnesota, Iowa and South Dakota with a total capacity of 1,243,000 bu. would be left without shipping means.

C. P. Ellis, statistician of the Iowa Railroad Commission, presented statistics showing that the M. & St. L. serves 29 counties in Iowa, with a population of 745,675 or 30.18 per cent of the entire population of the state. In these counties are 9,819,677 acres of farm land, which is 28.86 per cent of all the farm lands of Iowa. He also presented figures on crops raised and other statistics.

D. L. Kelly, rate expert of the South Dakota Railroad Commission testified that partition of the M. & St. L. among seven other roads would impose a definite handicap on business and agriculture in South Dakota, while the proposed abandonment of several branch lines would deal the state a severe blow by the elimination of needed service, the elimination of advantageous rates and routes and the stagnation of business in towns on those lines. He was optimistic in predicting that the road's freight tonnage would increase steadily when business has approached nearer to complete recovery and farmers have a few years of better crop production.

H. W. Ward, acting traffic manager of the M. & St. L., testified that 77 industries served by the railroad would be affected

by its sale and dismemberment. He also described the improvement in operating income during the first five months of 1936. In this period there has been a 42.92 per cent increase in cars forwarded and received, as compared with the same period in 1935, and a 31.81 per cent increase over 1934. With general business conditions now estimated at 81 per cent of normal, the road is making an aggressive effort to secure an even greater share of the available freight traffic, he said. During the first 16 days of June there has been a 34.5 per cent increase in freight cars loaded on the line and a 39 per cent increase in cars received from connecting lines, he said.

S. W. W. Carr, traffic expert of the Aberdeen, S. D., Chamber of Commerce, testified that the abandonment of many sections of the M. & St. L. in South Dakota will greatly delay service for towns in that state and tend to increase rates. He said that Watertown's packing industry will be hard hit and that costs of getting sand and gravel from the state's most extensive pits west of Watertown will be greatly increased because abandonment will destroy direct service.

Foreclosure Sale.—Sale of the Minneapolis & St. Louis scheduled for June 19, was adjourned to August 21, when no bids were offered.

MOBILE & OHIO.—*R. F. C. Loan.*— The Interstate Commerce Commission has authorized the extension for two years of maturity date of $850,000 of a loan of $877,599 from the Reconstruction Finance Corporation to the receivers of this company which falls due July 7.

NEW YORK, CHICAGO & ST. LOUIS.—*Equipment Trust Certificates.*—Estabrook & Co. and two associated companies have offered, subject to the approval of the Interstate Commerce Commission, $1,410,000 of 3 per cent equipment trust certificates of this company, maturing 1937-51, priced to yield from 0.75 per cent to 3.25 per cent.

OLD COLONY.—*Trustees.*—The federal court at New Haven has named the trustees of the New Haven Railroad as trustees also of the Old Colony, despite opposition of outside interests which sought the naming of an independent trustee for the Old Colony.

PERE MARQUETTE.—*Equipment Trust Certificates.*—This company, which recently applied to the Interstate Commerce Commission for authority for an issue of $1,260,000 of 2½ per cent equipment trust certificates, has reported to the commission that it received seven bids for the issue, the highest being that of Hallgarten & Co., 102.03.

PULLMAN COMPANY.—*Final Valuation.*—The Interstate Commerce Commission has issued a report reaffirming, on reconsideration, its findings of July 31, 1934, placing the value of this company's owned and used property at $170,000,000. On April 17, 1935, the company filed an application for reconsideration, alleging that the value reported was inadequate.

One of the points on which the company asked reconsideration was the commission's deduction from the recorded investment account of the 10 per cent of the cost of cars paid by the operating department to the manufacturing department prior to the transfer of the manufacturing operations to the Pullman Car & Manufacturing Corporation in 1924. The commission held that this was not a money outlay on the part of the Pullman Company. Commissioners Porter and Caskie dissented from this finding. The commission also declined to make a separate allowance under the head of "other values and elements of value" for the intangible value represented by the contract structure developed by the company.

SOUTHERN PACIFIC.—*Acquisition.*—This company has applied to the Interstate Commerce Commission for authority to lease the property of the Union Belt of Oakland, Calif., which it has operated since 1910.

WHEELING & LAKE ERIE.—*Abandonment.*—This company has applied to the Interstate Commerce Commission for authority to abandon its line from Carrollton, Ohio, to Sherrodsville, 11.87 miles.

Average Prices of Stocks and of Bonds

	June 23	Last week	Last year
Average price of 20 representative railway stocks..	48.28	47.99	33.91
Average price of 20 representative railway bonds..	80.00	80.10	76.06

Railway Officers

EXECUTIVE

L. B. Lyman, assistant to the general manager of the Chicago, Burlington & Quincy Lines West of the Missouri River, with headquarters at Omaha, Neb., has been appointed to the newly-created position of executive assistant with headquarters at Denver, Colo., effective July 1.

Ralph A. Cox, whose appointment as assistant to the vice-president of the Railway Express Agency, Inc., with headquarters at San Francisco, Cal., was reported in the *Railway Age* of June 6, has been connected with this company and its predecessors for 36 years. He was born on April 4, 1882, at Salem, Ore., and entered the service of Wells Fargo & Company on June 1, 1900, as a clerk at Salem. During the following eight years he served in this position and as a driver and relief agent at various points, then being appointed chief clerk to the superintendent at San Francisco. Mr. Cox served in this position at various points, as route agent at Dunsmuir, Cal., and as chief clerk to the vice-president and general manager at San Francisco until July 1, 1915, when he was advanced to superintendent at El Paso, Tex. Three years later, when Wells Fargo & Company was consolidated with other express organizations to form the American Railway Express Company, Mr. Cox was appointed superintendent of organization at San Francisco. After the American Railway Express Company became the Railway Express Agency, Inc., in 1929, Mr. Cox served as superintendent at various points until January 1, 1935, when he was made superintendent of organization at San Francisco. On June 1 of the same year he was further advanced to superintendent of transportation and traffic with the same headquarters, which position he was holding at the time of his recent appointment as assistant to vice-president, effective June 1.

Ralph A. Cox

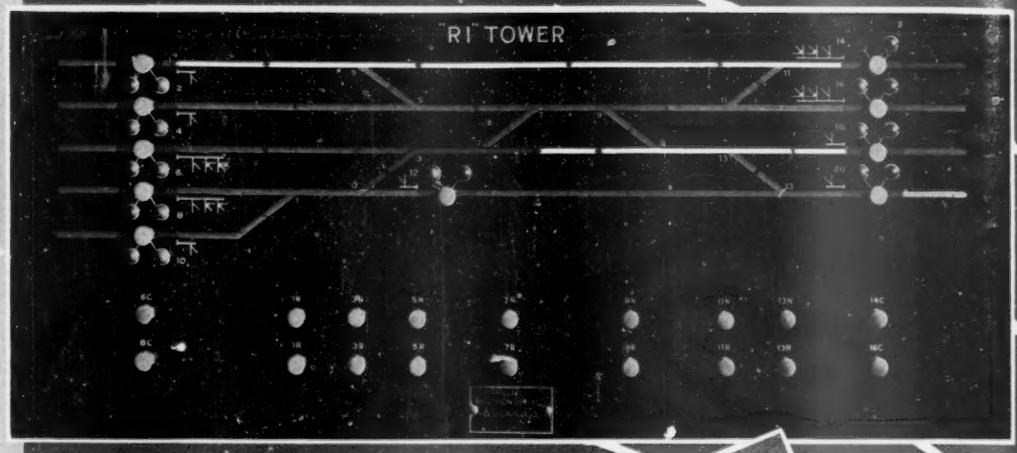
William Little Seddon, chief consulting engineer for the receivers of the Seaboard Air Line, and vice-president and consulting engineer for the corporation, with headquarters at Norfolk, Va., has retired from active service. Mr. Seddon was born on October 14, 1862, in Stafford County, Va., and was educated in the University of Missouri. He entered railroad service in March, 1899, with the Seaboard Air Line, serving consecutively until September, 1905, as instrumentman, resident engineer and assistant engineer. From September, 1905, to January, 1913, he was chief engineer and from the latter date until 1916, assistant to the president. Mr. Seddon was appointed vice-president in charge of operation in January, 1916, and the following year became general manager. He was appointed vice-president and consulting engineer on March 1, 1920.

W. L. Seddon

Continued on second left-hand page

MADE TO

Union "UR" Route Interlocking System, whereby the operator, by two simple manual motions, lines up all the switches of any route, then clears the signals for that route. It gives a simplified visual indication showing the whole route when set up, the position of each switch, and, in the event of a switch not moving to its proper position, its location by means of a dark space in an otherwise continuous luminous line. All switches, whether in the route or protecting the route, are automatically positioned. Chances of error are minimized. No manipulation required to restore control panel to normal condition. Can be applied to any form of power interlocking. » » » »



"Union" Electro-Pneumatic Interlocking Machine at Indianapolis Union Station. Safety, flexibility, speed of operation, economy and reliability of operation meet modern demands. » » » » »

"Union" Type F Electric Interlocking Machine at Leipsic on the Nickel Plate controlling joint interlocking with the D. T. & I. Reliable, safe, expeditious and economical operation has resulted on both roads. » » » » » » »

NEW YORK MONTREAL CHICAGO ST. LOUIS SAN FRANCISCO

MEASURE

"Union" Centralized Traffic Control Machine at Deshler, O., on the B. & O., controlling the territory between North Lima and Roachton. A typical C.T.C. installation on a busy section of single track where operation by signal indication without written train orders is used to increase the capacity of the line and improve operating performance. » » » » » » »

"Union" Automatic Interlocking at Komoka, Ont., at crossing of Canadian National double track line with Canadian Pacific single track line. Elimination of stops, increased train speeds, less fuel consumption, increased safety and reduced operating expenses have proved "Union" Automatic Interlocking one of the best self-liquidating investments. » » » »

Freight train leaving west classification yard on the A. T. & S. F. at Chillicothe controlled by "Union" Remote Control. On fourteen installations an average of 49.6 per cent on the investment was saved annually, or sufficient to pay for the installations in two years. Time saved per freight train stop eliminated averaged 11.9 minutes. » » » » »

"Union" All-Relay Interlocking Machine at Lynn, Mass., on the Boston & Maine. Replacing two mechanical interlockings, this installation has reduced time of switching moves of through trains almost 72 per cent. » » » » » » » » » » » » »

To meet specific operating requirements at interlockings, a made-to-measure signal system and method of control are necessary. Speed of switch operation, lever manipulation required, availibility of a-c. or d-c. source of power, type of traffic and installation and operating economy are factors to consider in measuring the proper interlocking and control system.

The Union Switch & Signal Company produces all types of interlocking and control systems. Its specialists recommend that type of installation most suitable for the conditions to be met. Ask our nearest office to assist in measuring your requirements. » » » » » » »

1881 **Union Switch & Signal Co.** 1936

SWISSVALE, PA.

Under the receivers, who were appointed on December 23, 1930, Mr. Seddon has been, in addition, chief consulting engineer for the receivers.

FINANCIAL, LEGAL AND ACCOUNTING

Frank H. Moore, general solicitor of the Kansas City Southern, has been appointed general counsel, with headquarters as before at Kansas City, Mo., to succeed **Samuel W. Moore,** who has retired, at his own request, with the title of retired general counsel. **A. F. Smith,** assistant general solicitor, has been appointed assistant general counsel, and the positions of general solicitor and assistant general solicitor have been abolished.

B. A. McManus, auditor of disbursements of the Chicago & North Western, has been promoted to assistant general auditor to succeed **C. H. Westbrook,** whose appointment as comptroller was noted in the *Railway Age* of May 23. **H. D. Barnes,** cost engineer in the office of the auditor of capital expenditures, has been advanced to auditor of capital expenditures to replace **W. R. Kettenring,** who has been appointed auditor of disbursements to succeed Mr. McManus. All these officers have offices at Chicago. The appointments became effective on June 1.

Theodore W. Reath, general counsel of the Norfolk & Western at Philadelphia, Pa., who will retire on June 30, as noted in the *Railway Age* of June 20, was born in Allegheny County, Pa., on June 7, 1866. Mr. Reath was graduated from the University of Pennsylvania in 1887 and entered the service of the Norfolk & Western in 1888 as clerk in the legal department at Philadelphia. Three years later he was promoted to chief clerk, and in March, 1899, was appointed assistant solicitor. He was promoted to the position of assistant general solicitor in October, 1902, and, in 1907, became general solicitor. In June, 1919, Mr. Reath was appointed general counsel, the position he held until his retirement. Mr. Reath served as director of the company from March 25, 1924, to May 25, 1926.

OPERATING

W. F. Neale, Jr., has been appointed acting assistant supervisor of the Maryland division of the Pennsylvania, with headquarters at Wilmington, Del. It was reported erroneously in the *Railway Age* of June 20, page 1015, that Mr. Neale had been appointed acting assistant superintendent.

Willard G. Bowen, whose appointment as superintendent of the Kansas City division of the Chicago, Milwaukee, St. Paul & Pacific, with headquarters at Ottumwa, Iowa, was reported in the *Railway Age* of June 6, was born on July 18, 1884, at Tomah, Wis. He entered the service of the Milwaukee at the age of 15 years as an operator on the La Crosse division, being advanced to train dispatcher on the same division on June 6, 1903. On November 1, 1917, Mr. Bowen was further promoted to chief train dispatcher of the Northern division, being transferred to the La Crosse division in the following year, where he was advanced to trainmaster in 1920. For the following six years Mr. Bowen served in this position successively on the La Crosse, Iowa, Twin City Terminal and Sioux City and Dakota divisions. At the end of this period he was promoted to assistant superintendent of the Terre Haute division, being transferred to the Dubuque and Illinois division in 1931. He was located on the latter division, with headquarters at Savanna, Ill., at the time of his recent appointment as superintendent of the Kansas City division.

H. A. Israel has been appointed acting assistant superintendent of the Memphis division of the Missouri Pacific, with headquarters at Wynne, Ark., succeeding **C. W. Exline,** who has been granted a leave of absence. **W. A. Learmont** has been appointed acting trainmaster, all districts of the Illinois division (except that part of the East and West district between Bush and Marion, and except Bush yard), and the Missouri-Illinois Railroad east of the Mississippi river, with headquarters at Bush, succeeding Mr. Israel.

F. R. Mullen, general superintendent of the Lincoln, Wymore and Omaha divisions of the Chicago, Burlington & Quincy, with headquarters at Lincoln, Neb., has been promoted to general manager of the Lines West of the Missouri River, with headquarters at Omaha, Neb., to succeed **J. H. Aydelott,** who has been appointed general manager of the Lines East of the Missouri River, with headquarters at Chicago. Mr. Aydelott succeeds **W. F. Thiehoff,** who, having reached the retirement age, has retired under the pension rules of this company. **S. L. Fee,** superintendent at Aurora, Ill., has been appointed general superintendent at Lincoln to succeed Mr. Mullen. **W. E. Haist,** superintendent at Galesburg, Ill., has been transferred to Aurora to replace Mr. Fee, and has been succeeded by **W. R. Eble,** assistant superintendent at Brookfield, Mo. **J. E. Thiehoff,** assistant superintendent at Sterling, Colo., has been transferred to Brookfield to succeed Mr. Eble, and has been succeeded by **A. F. McKelvie,** trainmaster at Galesburg. **J. J. Ryan,** trainmaster at St. Joseph, Mo., has been transferred to Galesburg to succeed Mr. McKelvie, and has been succeeded by **George Ecknardt,** chief dispatcher at Casper, Wyo.

J. H. Aydelott

Mr. Aydelott has been associated with the Burlington and its subsidiaries for 32 years. He was born on October 13, 1883, in Jersey County, Ill., and after a high school and business college education he entered the service of the Burlington in 1902 as a stenographer and clerk at Brookfield, Mo. From 1903 to 1908 he served as timekeeper and accountant at the same point, then being appointed chief clerk to the division superintendent at St. Joseph, Mo. In 1911 he was promoted to chief clerk to the general superintendent at St. Louis, Mo., and in 1912 he was sent to Chicago as chief clerk to the assistant general manager. In 1916 Mr. Aydelott was advanced to trainmaster at La Crosse, Wis., and in the following year he was further promoted to superintendent at Hannibal, Mo., later being transferred to Omaha, Neb., and thence to Casper, Wyo. In 1920 Mr. Aydelott returned to Chicago as superintendent of transportation and in 1922 he was made general superintendent of the Illinois district, with headquarters at Galesburg, Ill. Early in 1930 he was appointed general manager of the Fort Worth & Denver City and the Wichita Valley (subsidiaries of the Burlington), with headquarters at Fort Worth, Tex., returning to the parent railroad on October 1, 1931, as general manager of the Lines West of the Missouri River, with headquarters at Omaha.

W. F. Thiehoff

Mr. Thiehoff is bringing to a close 53 years of continuous service on the Burlington. He was born on June 25, 1866, at Hunnewell, Mo., and entered the service of the Burlington in 1883 as a section laborer. During the following 22 years he served successively in this position, and as a telegraph operator, freight brakeman and freight and passenger conductor. In January, 1905, he was appointed trainmaster on the St. Joseph division, being transferred to the Brookfield division in

Continued on next left-hand page

How! Super CHIEF

We salute the Super CHIEF as it speeds westward through the mountains . . . The Santa Fe Railroad is to be praised for a noteworthy achievement. This ultra-fast passenger service between Chicago and Los Angeles with a deluxe train hauled by a high-powered Diesel-Electric Locomotive marks an outstanding development in rail transportation . . . Over mountain, plain, and desert, the Super CHIEF carries its passengers at time-saving speed amid comfort and convenience in SAFETY.

WESTINGHOUSE AIR BRAKE CO.

General Office and Works

WILMERDING • PENNSYLVANIA

March, 1906. In October of the following year he was further promoted to assistant superintendent, and thence to superintendent in July, 1908, serving in the latter position successively on the Ottumwa division, the Beardstown division, at Beardstown, Ill., and the La Crosse division, at La Crosse, Wis. In March, 1915, he was promoted to general superintendent of the Nebraska district at Lincoln, Neb., and from July, 1916, to January, 1921, he served as assistant general manager, Lines West of the Missouri River, at Omaha, Neb. At the end of this period he was advanced to general manager of the same lines and with the same headquarters, and in December, 1922, he was made general manager, Lines East of the Missouri River, with headquarters at Chicago, which position he held until his retirement.

TRAFFIC

A. G. Vogel, general agent on the Chicago, Burlington & Quincy at Herrin, Ill., has been appointed general agent, coal department, with headquarters at Chicago, to succeed **C. J. Nelson,** promoted.

C. J. Nelson, who has been appointed coal traffic manager of the Chicago, Burlington & Quincy, with headquarters at

C. J. Nelson

Chicago, as reported in the *Railway Age* of June 6, has been connected with this company for about 30 years. He was born on September 1, 1887, in Madison county, Iowa, and entered the service of the Burlington in July, 1906, as an operator and station agent in Iowa. Six years later he was transferred to the traffic department as traveling freight agent, being appointed commercial agent at Paducah, Ky., in March, 1920. Two years later Mr. Nelson was promoted to general agent in the coal fields at Herrin, Ill., and in August, 1925, he was sent to Chicago as general agent in the coal department. He was holding the latter position at the time of his recent appointment as coal traffic manager, which was effective on June 1.

A. D. Martin, who has been appointed general passenger agent of the Chicago, Rock Island & Pacific, with headquarters at Chicago, has been connected with this company for 28 years. He was born on December 11, 1886, at Grant City, Mo., and entered the service of the Rock Island on September 3, 1908, as a telegrapher. On April 8, 1914, he was appointed ticket agent at Iowa City, Iowa, and on December 26, 1921, he was advanced to traveling

A. D. Martin

passenger agent at Des Moines, Iowa, being transferred to Buffalo, N. Y., on September 1, 1924. Two years later Mr. Martin was promoted to general agent, passenger department, at Detroit, Mich., and on August 4, 1928, he was transferred to Omaha, Neb., where he was located at the time of his recent appointment, which was effective on June 15.

G. A. Hoffelder, whose appointment as assistant freight traffic manager of the Chicago, Burlington & Quincy, with headquarters at Chicago, was noted in the *Railway Age* of June 6, has been in the service of this company for nearly 30 years. He was born on June 27, 1887, at Cincinnati, Ohio, and entered the service of the Burlington in 1906 as a stenographer to the general agent at Cincinnati. Subsequently he was advanced through the positions of rate clerk, chief clerk, freight solicitor and traveling freight agent. In December, 1917, Mr. Hoffelder was sent to Chicago to assist in the transportation department, later becoming connected with the office of the federal manager at the same point dur-

G. A. Hoffelder

ing government control of the railroads. On January 1, 1920, following the termination of federal control, Mr. Hoffelder was assigned as an assistant in the handling of commerce matters, and on January 1, 1925, he was promoted to assistant general freight agent in charge of commerce matters. On April 1, 1936, he was made general freight agent in charge of commerce matters, which position he held until his appointment as assistant freight traffic manager, effective June 1.

MECHANICAL

M. B. McPartland, who has been appointed general superintendent of motive power of the Chicago, Rock Island & Pacific, as reported in the *Railway Age* of June 13, was born on October 3, 1882, at Burlington, Iowa. Mr. McPartland received his higher education at Purdue University, graduating in 1905. Shortly thereafter he became a special apprentice with the Chicago, Burlington & Quincy, and in 1907 he went with the New York Central as gang foreman in the West Albany (N. Y.) shops. Two years later he became a draftsman on the Rock Island, and in 1910 he went with the National Railways of Mexico as mechanical engineer, returning to the service of the Rock Island in 1913 as general foreman in the mechanical department at Cedar Rapids, Iowa. Two years later he was transferred to the Forty-Seventh Street shops,

M. B. McPartland

Chicago, and after a short time in this position, he was advanced to master mechanic at Goodland, Kan. In 1917 he left the Rock Island to become master mechanic for the Denver & Salt Lake, later being advanced to superintendent of motive power of this road. In 1921 he left this company to become superintendent of motive power of the Western Pacific, which position he was holding at the time of his recent appointment as general superintendent of motive power of the Rock Island, effective June 15.

ENGINEERING AND SIGNALING

G. W. Spangler has been appointed acting assistant supervisor telegraph and signals of the Maryland division of the Pennsylvania at Wilmington, Del. It was reported erroneously in the *Railway Age* of June 20 that Mr. Spangler had been

Continued on next left-hand page

And Now 15 NEW LOCOMOTIVES *FOR THE* UNION PACIFIC

Equipped with FIREBARS

IN ADDITION to specifying FIREBARS on 15 new locomotives just purchased from Alco the Union Pacific placed orders this month for 45 additional sets to be applied to its present power—Over 365 engines FIREBAR equipped on the Union Pacific.

WAUGH FIREBAR

BETTER FIRES

FIREBAR DIVISION
OF THE
WAUGH EQUIPMENT COMPANY
New York Chicago St. Louis
Canadian Waugh Equipment Company, Montreal, Que.

appointed acting assistant superintendent telegraph and signals.

H. A. Lynch, assistant division engineer of the Pittsburgh East End division of the Baltimore & Ohio, with headquarters at Connellsville, Pa., has been promoted to division engineer of the Pittsburgh East End division, with the same headquarters, succeeding **J. L. Maher,** who has been transferred to the Baltimore West End division, with headquarters at Baltimore, succeeding **C. B. Harveson,** whose promotion to engineer maintenance of way, Eastern lines, was noted in the *Railway Age* of June 20.

C. B. Harveson, whose appointment as engineer maintenance of way of the eastern lines of the Baltimore & Ohio at Baltimore, Md., was noted in the *Railway Age* of June 20, entered the service of the Reading in 1905 as a draftsman. He

C. B. Harveson

served successively with that road until 1922 as assistant engineer, assistant supervisor and supervisor. He entered the service of the Baltimore & Ohio on July 1, 1922, as division engineer at Philadelphia, Pa. On June 1, 1927, he became division engineer of the east end of the Baltimore division and was transferred in the same capacity to the west end of that division on June 1, 1933.

OBITUARY

J. G. Warnecke, division storekeeper of the Markham storehouse (Chicago) of the Illinois Central, who has been on a leave of absence since late in 1935, died at the Illinois Central hospital at Chicago on June 19. Mr. Warnecke had been a patient at the hospital since he underwent an operation on May 25.

Edward A. Donnelly, freight traffic manager of the Chicago, St. Paul, Minneapolis & Omaha, with headquarters at Minneapolis, Minn., whose death on June 14 was noted in the *Railway Age* of June 20, had been connected with the Omaha for more than 47 years. He entered railway service at an early age in the local offices of this road at St. Paul, Minn., and advanced through various positions in the traffic department, including those of traveling freight and passenger agent, commercial agent at Minneapolis, Minn., and general agent at the same point. In 1921 Mr. Donnelly was promoted to assistant general freight agent at Minneapolis, and on June 1, 1929, he was further advanced to freight traffic manager, holding this position until his death.

W. G. Black, vice-president in charge of purchasing, stores and mechanical matters of the Chesapeake & Ohio, the New York, Chicago & St. Louis and the Pere Marquette (the Van Sweringen Lines) with headquarters at Cleveland, Ohio, died on June 20 at the Lakeside hospital in Cleveland, after an illness of two months. Mr. Black had been connected with the various units of the Van Sweringen Lines for about 37 years. He was born on April 19, 1877, at Lima, Ohio, and after a public school and business college education entered railway service in 1893 as a machinist apprentice at the Stony Island (Chicago) shops of the Nickel Plate. Four years later he left railway service to continue his education at Armour Institute of Technology, Chicago, where he took a post graduate course in mechanical subjects. After the completion of his studies he returned to railway service as a machinist at the Burnside (Chicago) shops of the Illinois Central, and from 1900 to 1903 he was employed at the South Chicago plant of the Illinois Steel Company (now part of the Carnegie-Illinois Steel Company), then returning to the Nickel Plate as a machinist. Subsequently he was advanced to machine shop foreman, and in 1904 he was further promoted to enginehouse foreman at Fort Wayne, Ind. On January 1, 1909, he was advanced to master mechanic at the Stony Island shops, where he remained until February, 1923, when he became superintendent of motive power of the Nickel Plate and Lake Erie & Western districts of the Nickel Plate, with headquarters at Cleveland. On January 1, 1927, his jurisdiction was extended to include the entire Nickel Plate system, and in the following month he left this company to go with the Erie as mechanical assistant to the president, with head-

W. G. Black

quarters at Cleveland. In 1929 he left the Erie to go with the C. & O. in the same capacity and subsequently his jurisdiction was extended to include the Pere Marquette. In 1931 he was appointed assistant vice-president of the C. & O. and the Pere Marquette, with jurisdiction over purchases and stores matters. In March, 1933, he was appointed also to the same position on the Nickel Plate, and on April 17 of the same year he was appointed vice-president of these roads in charge of purchasing, stores and mechanical matters. At the time of his death Mr. Black was vice-chairman of Division V—Mechanical, Operations and Maintenance Department, Association of American Railroads, to which he was elected at the 1935 annual meeting. His name had been placed in nomination for the chairmanship of this organization to be voted on at the annual meeting held at Chicago Thursday and Friday of this week. He was also a member of the General committee of the Purchases and Stores division, A.A.R., past president of the Western Railway Club (1927-1928), and vice-president of the International Railway Fuel Association (1928-1935).

Gaston C. Hand, retired vice-president and secretary of the Kansas City Southern, with headquarters at New York, died sud-

Gaston C. Hand

denly on June 22 at his home in that city. Mr. Hand was born at Belmont, N. C., on July 2, 1870, and received his education at St. Mary's College (now Belmont Academy), Philadelphia Law School and New York University. In 1891 he entered railroad service with the Atlantic Coast Line as station agent and telegraph operator, serving in that capacity until 1893. From 1893 to 1896 he served as dispatcher's apprentice and train dispatcher, and in the latter year he became chief clerk of the traffic and transportation departments. In 1901, he joined the transportation department of the Pennsylvania. From 1902 to 1904 he was engaged in banking and during the period from 1904 to 1908 he served as statistician of the firm of Ladenburg, Thalmann & Co. From 1908 to 1909, he was connected with the Interstate Commerce Commission as examiner. He entered the service of the Kansas City Southern as secretary in 1909, and in 1918 was appointed also vice-president of that road and several subsidiary companies, which positions he held until his retirement in 1930.

Operating Revenues and Operating Expenses of Class I Steam Railways in the United States

Compiled From 140 Monthly Reports of Revenues and Expenses Representing 144 Class I Steam Railways

FOR THE MONTH OF APRIL, 1936 AND 1935

Item	United States		Eastern District		Southern District		Western District	
	1936	1935	1936	1935	1936	1935	1936	1935
Average number of miles operated	237,026	238,209	58,657	59,025	44,940	45,249	133,429	133,935
Revenues:								
Freight	$256,322,230	$222,564,014	$114,264,232	$96,676,882	$50,033,655	$43,881,002	$92,024,343	$82,006,130
Passenger	30,652,565	27,183,068	17,760,734	16,251,083	4,295,362	3,836,395	8,596,469	7,095,590
Mail	7,748,282	7,605,728	2,964,435	2,956,289	1,390,235	1,336,803	3,393,612	3,312,636
Express	5,821,174	5,223,256	2,402,585	2,069,294	1,500,153	1,473,171	1,918,436	1,680,791
All other transportation	6,687,755	6,178,678	3,535,981	3,309,802	677,312	678,250	2,474,462	2,190,626
Incidental	5,555,176	5,363,486	3,064,921	2,884,932	922,587	932,757	1,567,668	1,545,797
Joint facility—Cr.	865,139	754,084	260,113	246,212	189,543	174,097	415,483	333,775
Joint facility—Dr.	242,693	209,248	49,514	53,228	21,411	17,332	171,768	138,688
Railway operating revenues	313,409,628	274,663,066	144,203,487	124,341,266	58,987,436	52,295,143	110,218,705	98,026,657
Expenses:								
Maintenance of way and structures	36,301,551	30,824,724	13,696,672	11,506,196	6,677,235	6,298,589	15,927,644	13,019,939
Maintenance of equipment	64,233,358	55,278,370	29,046,061	24,393,528	11,511,084	10,529,637	23,676,213	20,355,205
Traffic	8,092,431	8,071,527	2,972,126	2,936,473	1,594,721	1,532,480	3,525,584	3,602,574
Transportation	110,913,605	102,258,211	51,312,484	47,158,192	18,735,898	17,462,810	40,865,223	37,637,209
Miscellaneous operations	2,681,602	2,463,285	1,240,974	1,143,695	382,715	329,147	1,057,913	990,443
General	13,085,022	10,701,832	5,767,108	5,627,478	2,217,704	1,409,403	5,100,210	3,664,951
Transportation for investment—Cr.	234,840	182,158	19,139	26,845	25,031	23,192	190,670	132,121
Railway operating expenses	235,072,729	209,415,791	104,016,286	92,738,717	41,094,326	37,538,874	89,962,117	79,138,200
Net revenue from railway operations	78,336,899	65,247,275	40,187,201	31,602,549	17,893,110	14,756,269	20,256,588	18,888,457
Railway tax accruals	25,751,082	20,389,840	11,071,210	8,409,487	5,127,384	4,258,381	9,552,488	7,721,972
Railway operating income	52,585,817	44,857,435	29,115,991	23,193,062	12,765,726	10,497,888	10,704,100	11,166,485
Equipment rents—Dr. balance	7,812,396	7,243,713	3,573,804	3,435,462	838,674	821,561	3,399,918	2,986,690
Joint facility rent—Dr. balance	3,225,777	2,905,004	1,746,000	1,700,494	383,264	241,988	1,096,513	962,522
Net railway operating income	a 41,547,644	b 34,708,718	23,796,187	18,057,106	11,543,788	9,434,339	6,207,669	7,217,273
Ratio of expenses to revenues (per cent)	75.00	76.24	72.13	74.58	69.67	71.78	81.62	80.73
Depreciation included in operating expenses	16,132,234	16,027,438	7,040,873	7,074,110	3,183,531	2,955,258	5,907,830	5,998,070
Total maintenance before depreciation	84,402,675	70,075,656	35,701,860	28,825,614	15,004,788	13,872,968	33,696,027	27,377,074
Net railway operating income before depreciation	57,679,878	50,736,156	30,837,060	25,131,216	14,727,319	12,389,597	12,115,499	13,215,343

FOR FOUR MONTHS ENDED WITH APRIL, 1936 AND 1935

Average number of miles operated	237,085	238,283	58,675	59,019	44,948	45,262	133,462	134,002
Revenues:								
Freight	$994,447,484	$869,674,545	$436,662,410	$387,991,629	$202,501,554	$177,005,598	$355,283,520	$304,677,318
Passenger	127,172,748	112,620,909	72,740,000	66,519,629	19,847,696	17,081,615	34,585,052	29,019,665
Mail	30,366,846	30,019,557	11,604,829	11,522,785	5,480,769	5,340,267	13,281,248	13,156,505
Express	17,470,237	15,732,636	6,834,163	6,003,263	4,375,592	4,431,690	6,260,482	5,297,683
All other transportation	26,460,470	23,757,562	13,877,174	12,823,866	2,722,633	2,505,124	9,860,663	8,428,572
Incidental	22,725,476	20,610,542	12,563,307	11,268,203	3,763,091	3,497,244	6,399,078	5,845,095
Joint facility—Cr.	3,556,987	3,091,403	1,099,709	1,020,191	724,142	645,786	1,733,136	1,425,426
Joint facility—Dr.	929,392	826,851	201,074	241,906	83,152	67,271	645,166	517,674
Railway operating revenues	1,221,270,856	1,074,680,303	555,180,518	496,907,660	239,332,325	210,440,053	426,758,013	367,332,590
Expenses:								
Maintenance of way and structures	133,322,708	111,883,786	53,571,015	44,080,213	25,897,367	24,240,551	53,854,326	43,563,022
Maintenance of equipment	252,576,802	220,511,398	115,407,338	99,611,180	46,038,397	42,205,124	91,131,067	78,695,094
Traffic	31,944,845	30,522,540	11,784,404	11,390,544	6,477,790	6,041,402	13,682,651	13,090,594
Transportation	459,027,347	407,840,188	213,110,452	191,068,410	77,369,547	69,633,292	168,547,348	147,138,486
Miscellaneous operations	11,139,635	9,775,519	5,230,867	4,666,433	1,669,187	1,424,160	4,239,581	3,684,926
General	52,178,695	54,312,901	22,949,664	23,046,790	8,892,792	8,592,144	20,336,239	22,673,967
Transportation for investment—Cr.	853,770	711,053	116,009	131,220	84,455	94,848	653,306	484,985
Railway operating expenses	939,336,262	834,135,279	421,937,731	373,732,350	166,260,625	152,041,825	351,137,906	308,361,104
Net revenue from railway operations	281,934,594	240,545,024	133,242,787	123,175,310	73,071,700	58,398,228	75,620,107	58,971,486
Railway tax accruals	94,398,547	80,104,823	38,864,844	32,226,640	19,995,453	17,204,257	35,538,250	30,673,926
Railway operating income	187,536,047	160,440,201	94,377,943	90,948,670	53,076,247	41,193,971	40,081,857	28,297,560
Equipment rents—Dr. balance	29,004,380	27,694,963	13,961,945	13,825,079	1,421,586	1,778,724	13,620,849	12,091,160
Joint facility rent—Dr. balance	12,419,045	11,669,997	6,922,658	6,749,607	1,331,398	1,118,481	4,164,989	3,801,909
Net railway operating income	c 146,112,622	e 121,075,241	73,493,340	70,373,984	50,323,263	38,296,766	22,296,019	12,404,491
Ratio of expenses to revenues (per cent)	76.91	77.62	76.00	75.21	69.47	72.25	82.28	83.95
Depreciation included in operating expenses	64,533,189	64,916,816	28,049,660	28,136,003	12,788,422	12,690,607	23,695,107	24,090,206
Total maintenance before depreciation	321,366,321	267,478,368	140,928,693	115,555,390	59,147,342	53,755,068	121,290,286	98,167,910
Net railway operating income before depreciation	210,645,811	185,992,057	101,543,000	98,509,987	63,111,685	50,987,373	45,991,126	36,494,697

a Includes charges to Railway Tax Accruals in the total amount of $5,386,509, itemized as follows: $1,417,324 for taxes under the requirements of the Social Security Act of 1935, and $3,969,185 under the requirements of an Act approved August 29, 1935, levying an excise tax upon carriers and an income tax upon their employees, and for other purposes. (Public No. 400, 74th Congress.)

b Includes credits to General Expenses in the amount of $2,050,653 on account of reversal of charges previously made for liability under the Railroad Retirement Act of 1934.

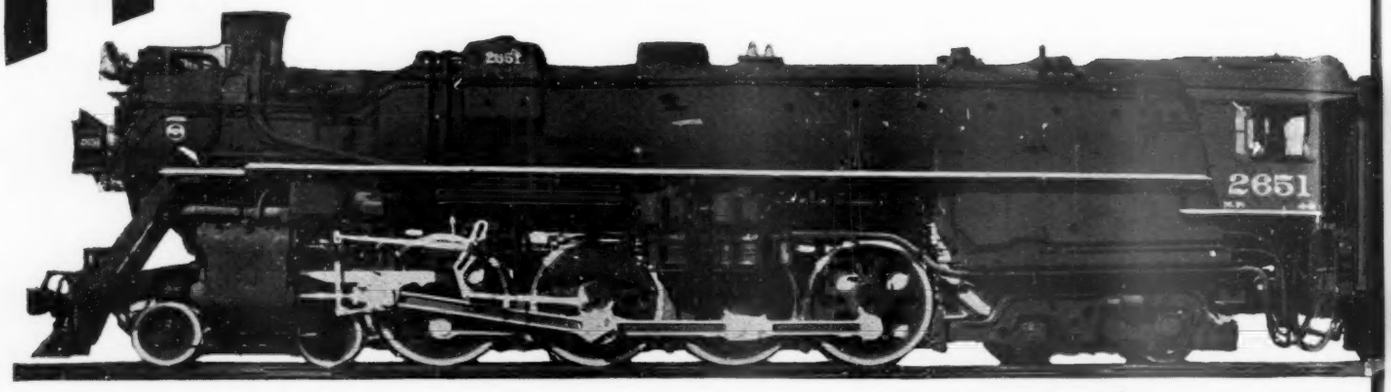
c Includes charges to Railway Tax Accruals in the total amount of $13,700,048, itemized as follows: $5,713,086 for taxes under the requirements of the Social Security Act of 1935, and $7,986,962 under the requirements of an Act approved August 29, 1935, levying an excise tax upon carriers and an income tax upon their employees, and for other purposes. (Public No. 400, 74th Congress.)

d Deficit or other reverse items.

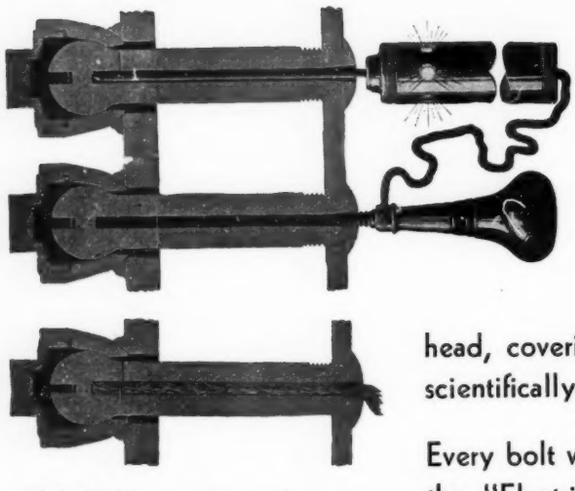
e Includes charges to General Expenses in the amount of $4,143,041 on account of accruals for liability under the Railroad Retirement Act of 1934.

Compiled by the Bureau of Statistics, Interstate Commerce Commission. Subject to revision.

HIGH PRESS



With



With the Flannery Electrical contact method, the lighting of the electric bulb indicates that the hole is open. When water pressure is applied, fractured bolts are found by leakage of water through tell-tale holes. It's the sure way and the least expensive.

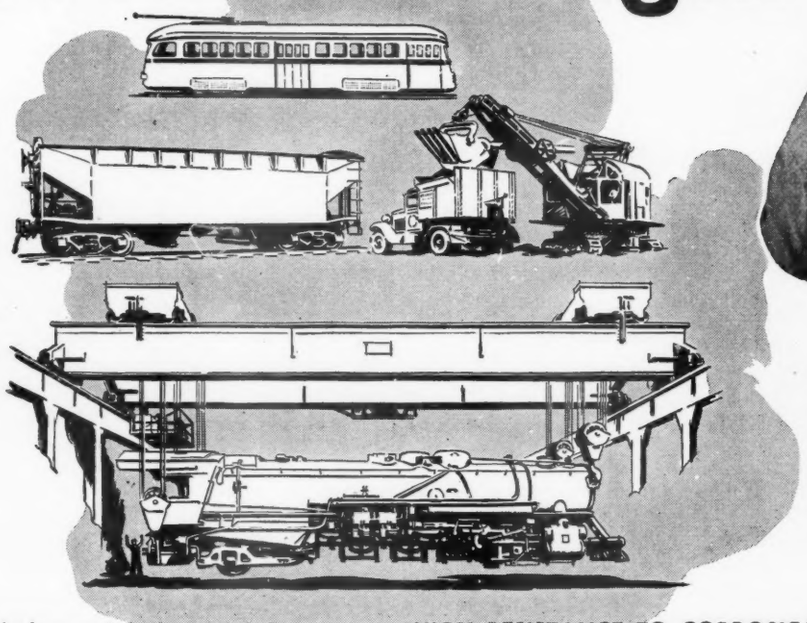
INSTALLATIONS of Tell-Tale type flexible staybolts, wherein each bolt has a drilled tell-tale hole extending from the firebox and through its entire length and into the head, covering every breakable portion of the bolt, and tested with a scientifically precise instrument provides this safety.

Every bolt which does not show a tell-tale indication upon completion of the "Electrical and Hydrostatic Test" is a perfectly safe bolt—AND **YOU KNOW IT'S SAFE!**

This positive, reassuring knowledge of perfect security—at what is perhaps the most extremely vital point in every stayed locomotive boiler—is a unique, outstanding advantage of this design.

FLANNERY BOLT

Inland Hi-Steel Solves Your Problem of Useless Weight



● Useless weight is costly. On equipment you use, power is wasted dragging around useless weight. On equipment you may build for sale, useless weight is fast becoming a sales handicap.

Inland Hi-Steel has a tensile strength of from 70,000 to 75,000 lbs., and the yield point is from 55,000 to 60,000 lbs.

With Inland Hi-Steel... the new, high strength alloy... the weight of any piece of motive equipment can be reduced from 25% to 50% for Hi-Steel is twice as strong as carbon steel. The economies soon pay for Hi-Steel, for less material is required, and operating costs are reduced.

HIGH RESISTANCE TO CORROSION

Two of the principal alloys used in Hi-Steel are practically impervious to corrosion. Their alloying influence makes Inland Hi-Steel endure corrosion several times as long as carbon steel.

Inland Hi-Steel is readily welded, cut, formed, and otherwise fabricated. It has a high degree of uniformity. Made in structurals, bars, plates and sheets, all Inland Products where high strength and high corrosion-resistance are desirable.

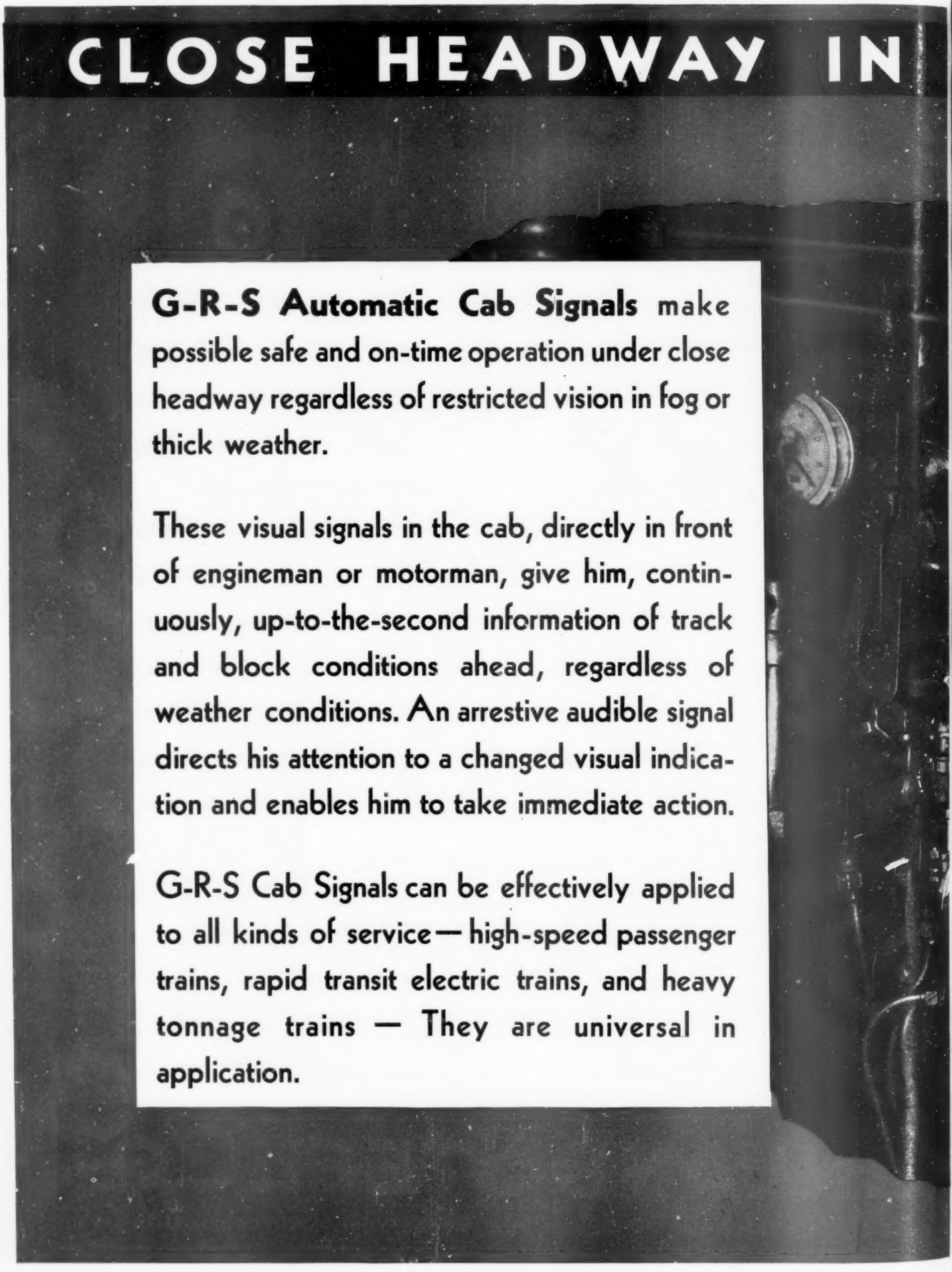
Inland metallurgists will gladly discuss the possibilities of improving your products with Inland Hi-Steel. As a beginning write for Bulletin No. 10.

SHEETS • STRIP • TIN PLATE • RAILS • TRACK ACCESSORIES
PLATES • STRUCTURALS • PILING • BARS • RIVETS • BILLETS

INLAND STEEL CO.

General Offices: 38 South Dearborn Street, Chicago, Illinois

CLOSE HEADWAY IN



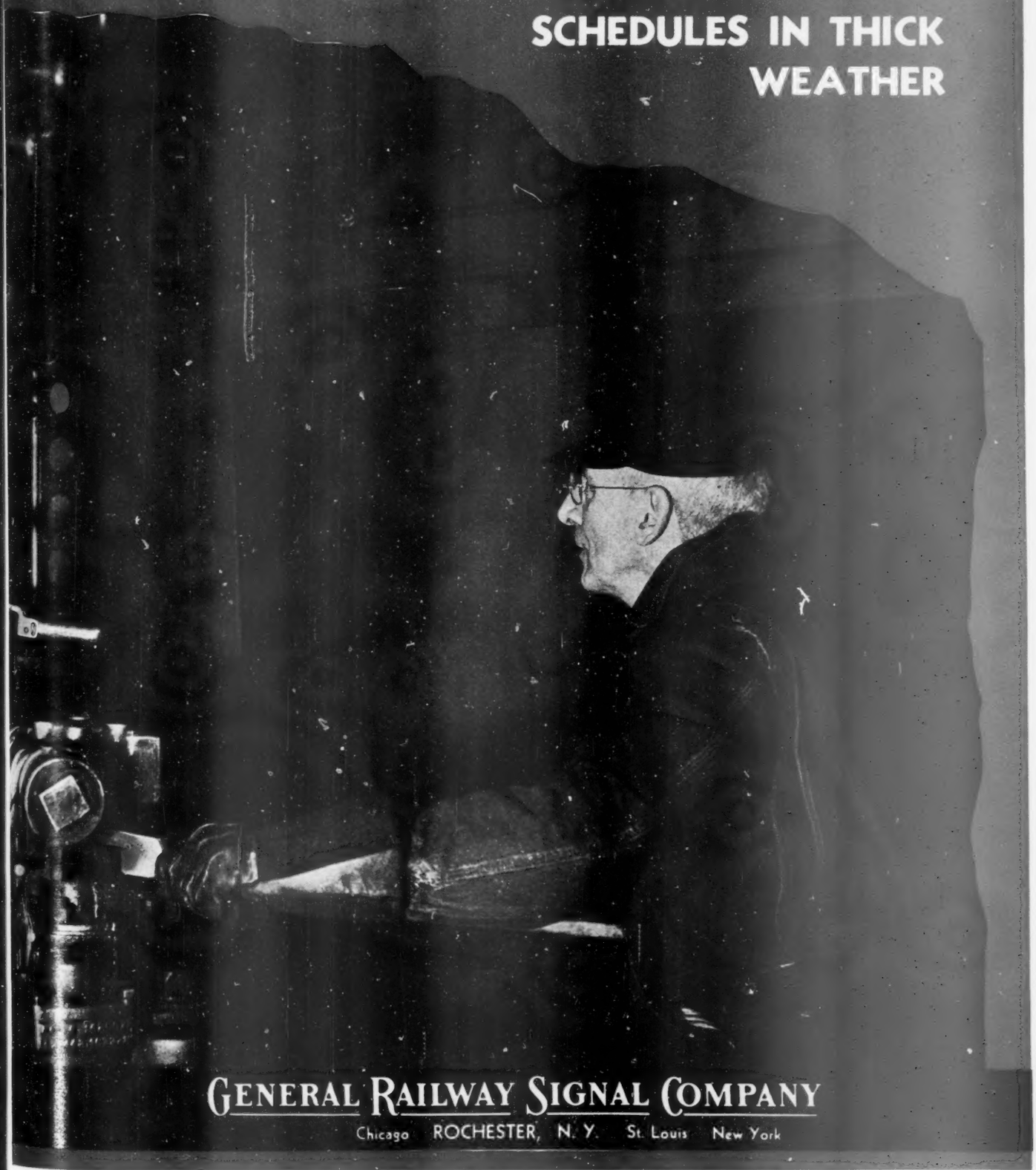
G-R-S Automatic Cab Signals make possible safe and on-time operation under close headway regardless of restricted vision in fog or thick weather.

These visual signals in the cab, directly in front of engineman or motorman, give him, continuously, up-to-the-second information of track and block conditions ahead, regardless of weather conditions. An arrestive audible signal directs his attention to a changed visual indication and enables him to take immediate action.

G-R-S Cab Signals can be effectively applied to all kinds of service — high-speed passenger trains, rapid transit electric trains, and heavy tonnage trains — They are universal in application.

FOG OR THICK WEATHER

CAB SIGNALS MAINTAIN SCHEDULES IN THICK WEATHER



GENERAL RAILWAY SIGNAL COMPANY

Chicago ROCHESTER, N. Y. St. Louis New York

MAGNUS METALS

For Service and Delivery

BRONZE ENGINE CASTINGS
SATCO LINING MATERIAL
CAR AND LOCOMOTIVE
JOURNAL BEARINGS

Where Records are Made
You Will Find Magnus Products

"MAGNUS PRODUCTS ARE BRASS INSURANCE"

MAGNUS JOURNAL BEARINGS
STAND UP UNDER
THE HEAVIEST LOADS

LINK THE RAILROADS AND THE DURABLE GOODS INDUSTRY

MAGNUS COMPANY INC.
CHICAGO NEW YORK

MINER
DRAFT GEARS

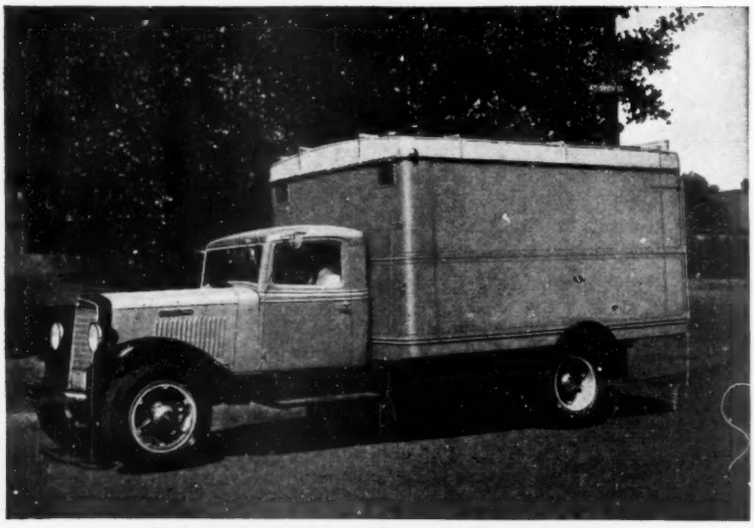
protect better

and

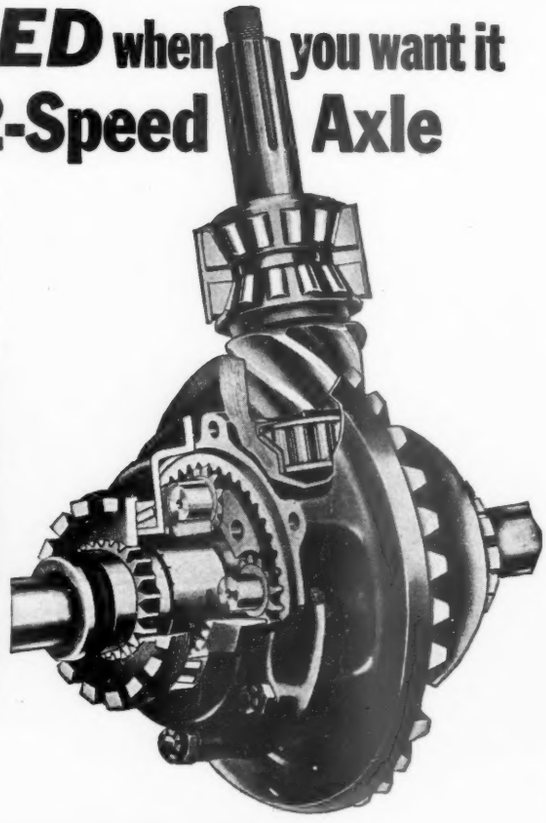
last longer

W. H. MINER, INC. CHICAGO

POWER when you need it—SPEED when you want it in the INTERNATIONAL 2-Speed Axle



An International with speed rear axle. These trucks bring new performance and economy to jobs like yours.



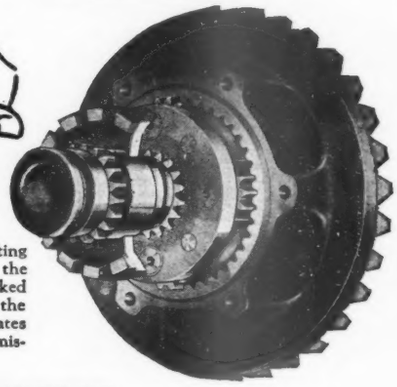
● The 2-speed rear axle trucks available in the International line now make it possible for truck users to obtain both high-speed and low-speed performance in one unit. A simple movement of the shifting lever changes the axle ratios instantly and silently without stopping the truck. The low-gear ratio provides *power* for hauling heavy loads through tough going and up steep hills, while the high-gear ratio allows *high speeds* on level roads or with light loads.

The extreme flexibility of these dual-range, full-floating rear axles enables the International 2-speed axle trucks to do more work at lower cost. When shifted to the low gear, the speed of the engine remains constant, but the speed of the axle and wheels is reduced, thereby providing unusual pulling power. In high gear, of course, the wheel speed is increased.

When you see these 2-speed rear-axle Internationals in action in a tough spot, you will get a good idea of what they can do for you. Ask the nearest Company-owned branch, or International dealer, for a demonstration. There is a full range of other trucks in the International line, from the Half-Ton unit to the powerful Six-Wheelers.

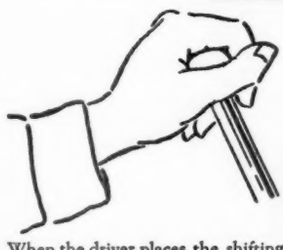
INTERNATIONAL HARVESTER COMPANY
(INCORPORATED)
606 So. Michigan Ave. Chicago, Illinois

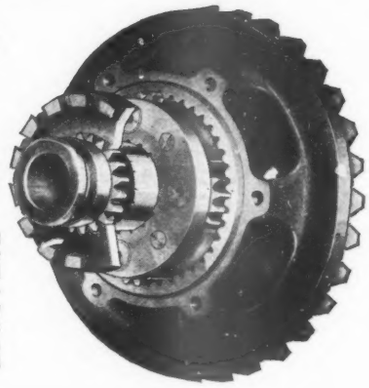
FORWARD for SPEED



When the driver places the shifting lever in the forward position, the four planetary gears are in the locked position and turn as part of the differential. The truck then operates as a high-speed unit in all transmission gears.

BACK for POWER

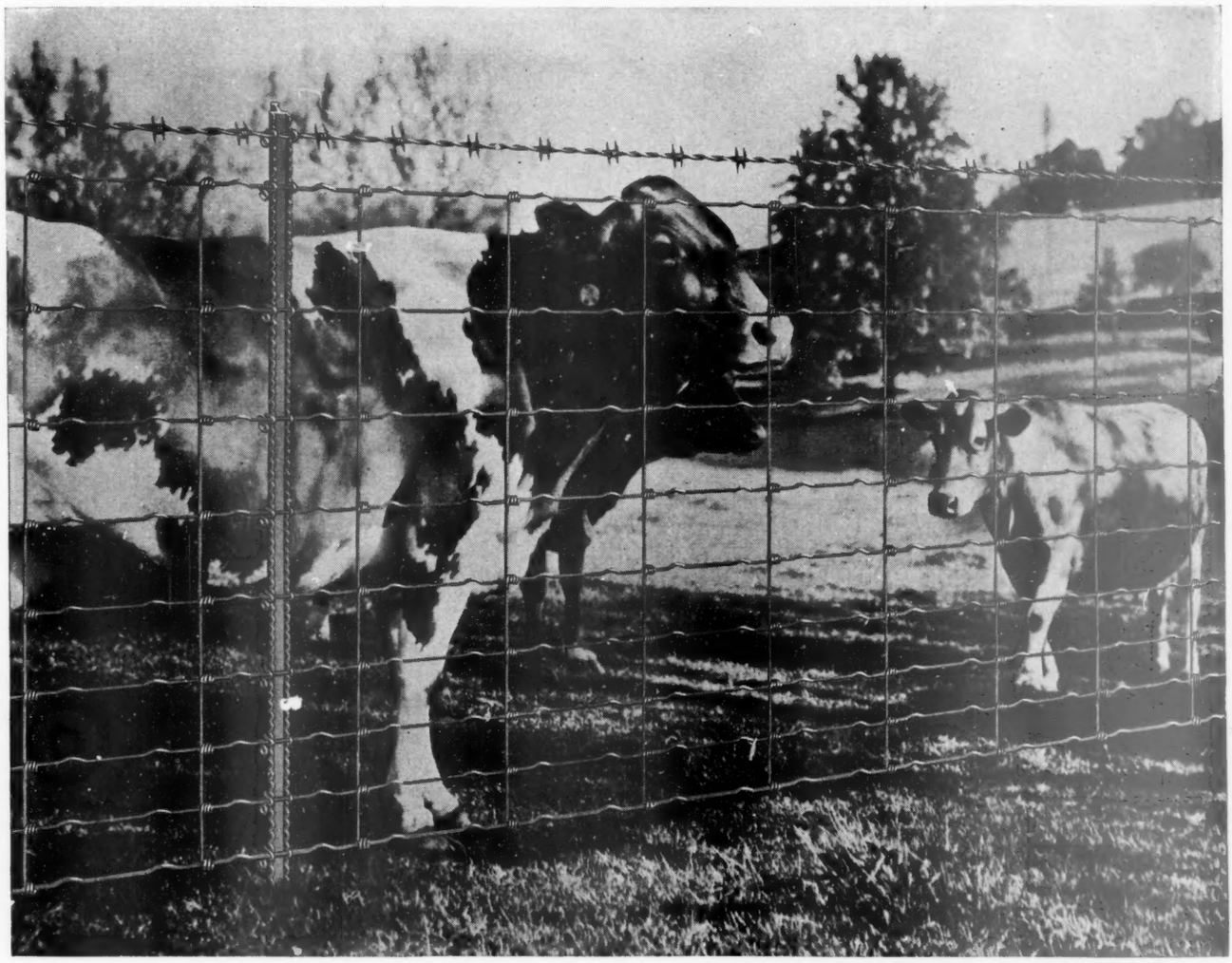




When the driver places the shifting lever in the back position, the four planetary gears are in the unlocked position, which allows them to rotate around the locking gear, thereby making a silent reduction of axle speed. The truck then operates in all transmission gears as a powerful low-speed unit.

INTERNATIONAL TRUCKS

To reduce stock claims . . .
fence the Right-of-Way



EACH year millions of dollars are spent protecting life and property at crossings, but what about the Right-of-Way?

The best way to reduce stock claims is to fence the Right-of-Way. The most economical protection is offered by American Railroad Fence and Banner Steel Line Posts. These products, including National Expanding Anchor End and Corner Posts, meet all specifications of the American Railway Engineering Association.

American Railroad Fence is made of medium hard wire, tough and sturdy. It is full gauge with rust resisting Copper Bearing Steel. The smooth, evenly coated galvanizing affords a full measure of protection against corrosion. The famous American Hinge Joint gives the flexibility that is necessary to withstand the heavy pressure of live stock. The use of these products is not only insurance against the adjustment of costly stock claims, but protection for life and property. Write for a personal consideration of your problems.

AMERICAN RAILROAD FENCE *and* BANNER STEEL POSTS

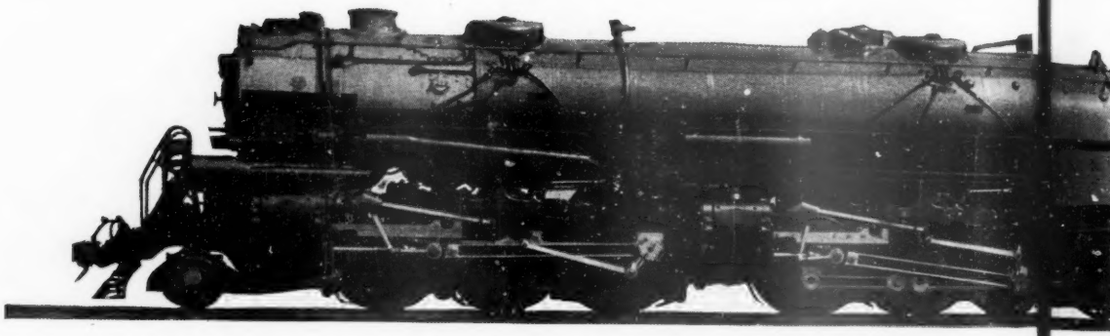
AMERICAN STEEL & WIRE COMPANY, *Chicago-New York* · COLUMBIA STEEL COMPANY, *San Francisco* · TENNESSEE COAL, IRON & RAILROAD COMPANY, *Birmingham*
United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

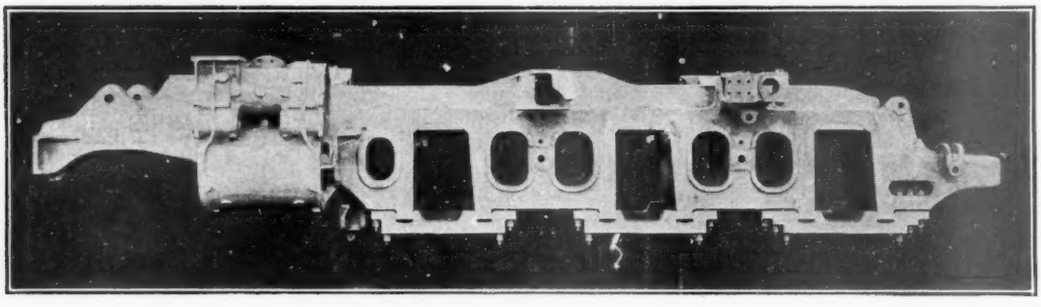
COMMONWEALTH

Cast Steel Products

On this locomotive Commonwealth one-piece beds, outside-bearing engine truck, Delta trailer truck, six-wheel tender trucks and water-bottom tender frame are used.



70" Drivers 24"x30" cylinders Wt. on Drivers 430100 lbs.

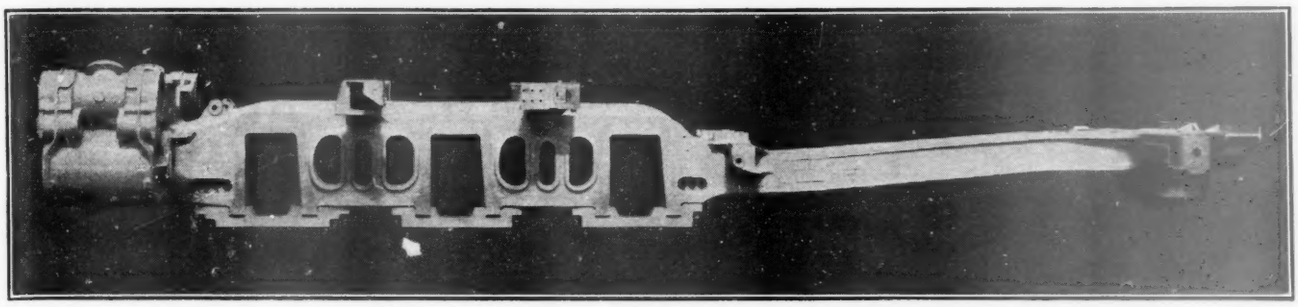


One-piece Bed for Front Unit

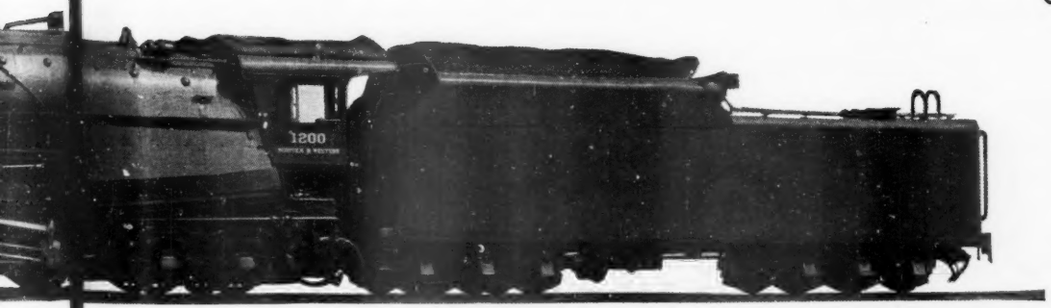
INTEGRAL CYLINDER BED, A STRONG SINGLE UNIT, REPLACES MANY PARTS AND MACHINE-FITTED BOLTS AND ELIMINATES A LARGE PORTION OF USUAL LOCOMOTIVE REPAIR COSTS.

NORFOLK AND WESTERN

blazes the trail in freight transportation with powerful high-speed locomotives built for maximum availability and lowest maintenance.



One-piece Bed for Rear Unit

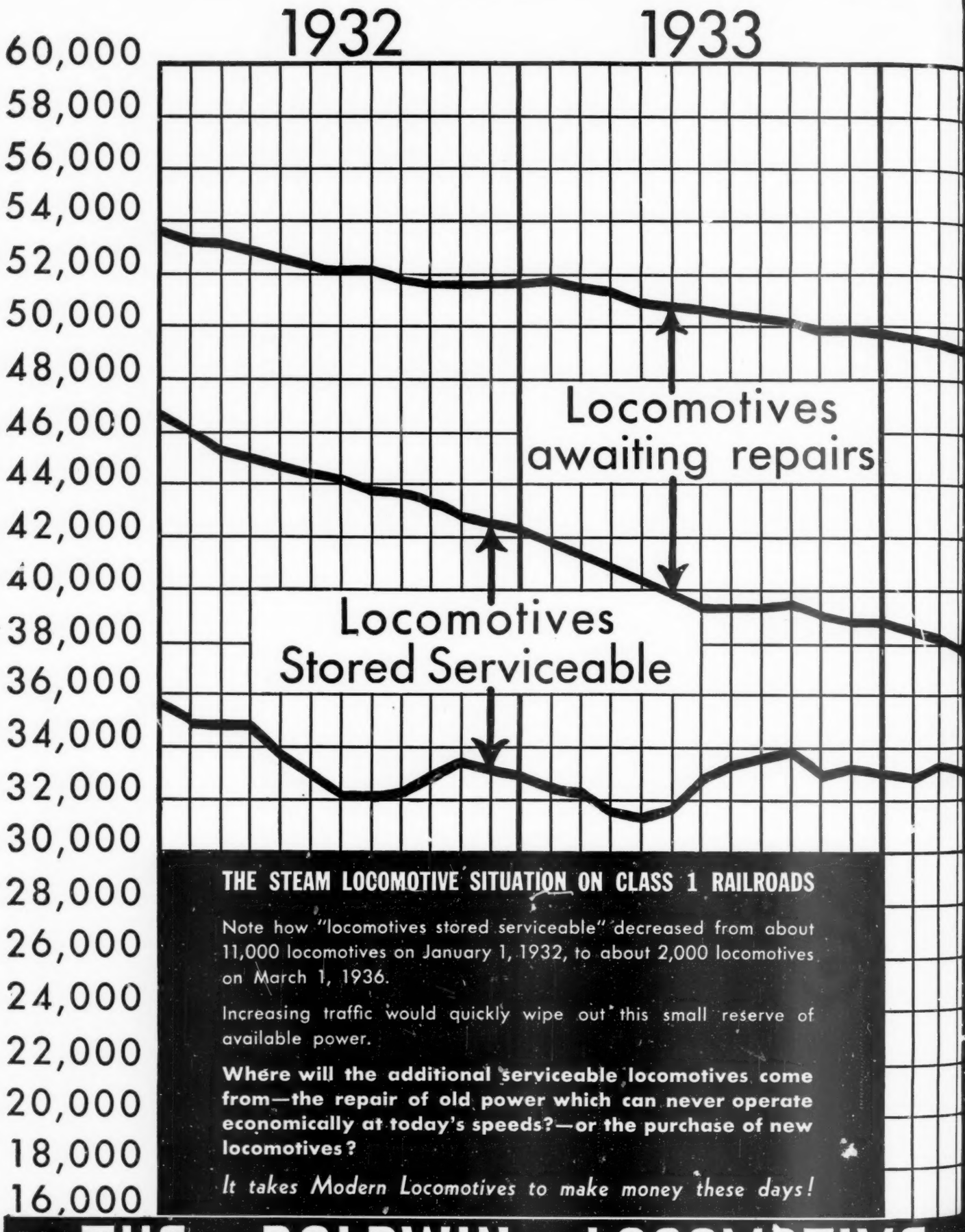


Tractive power 104500 lbs. 300 lb. steam pressure. Single expansion.

COMMONWEALTH PRODUCTS
INSURE MAXIMUM AVAILABILITY
AND LOWEST MAINTENANCE.

GENERAL STEEL CASTINGS CORPORATION

Granite City, Ill.. Eddystone, Pa.



THE STEAM LOCOMOTIVE SITUATION ON CLASS 1 RAILROADS

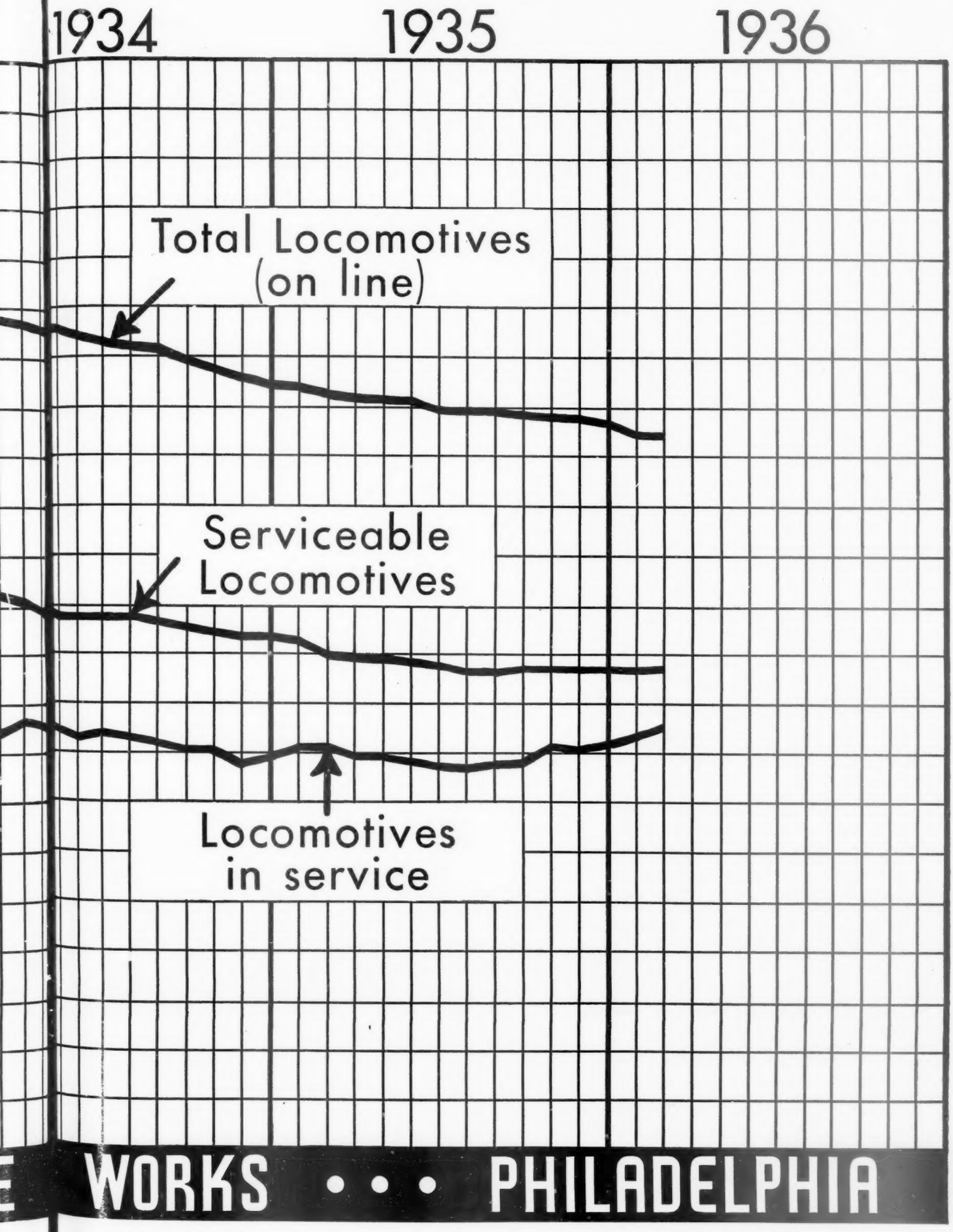
Note how "locomotives stored serviceable" decreased from about 11,000 locomotives on January 1, 1932, to about 2,000 locomotives on March 1, 1936.

Increasing traffic would quickly wipe out this small reserve of available power.

Where will the additional serviceable locomotives come from—the repair of old power which can never operate economically at today's speeds?—or the purchase of new locomotives?

It takes Modern Locomotives to make money these days!

THE BALDWIN LOCOMOTIVE



E WORKS • • • PHILADELPHIA

More PROFITABLE Freight OPERATION

NATIONAL
Type M-17-A
DRAFT GEAR
A.A.R. Approved

80% of railway operating revenues is derived from freight. National Draft-Gear Economies will convert a larger percentage of gross revenue into net operating income by reducing maintenance of equipment expenses. Car maintenance is definitely dependent upon draft gear performance. The National M-17-A Draft Gear ranks high in *ALL* vital and necessary requisites — **capacity, sturdiness, endurance, smoothness and uniformity.** On thousands of cars this time-tested, service-proved draft gear has demonstrated an unequalled ability to provide maximum protection to cars and lading.

NATIONAL
ELECTRIC NACO STEEL
DRAFT GEARS

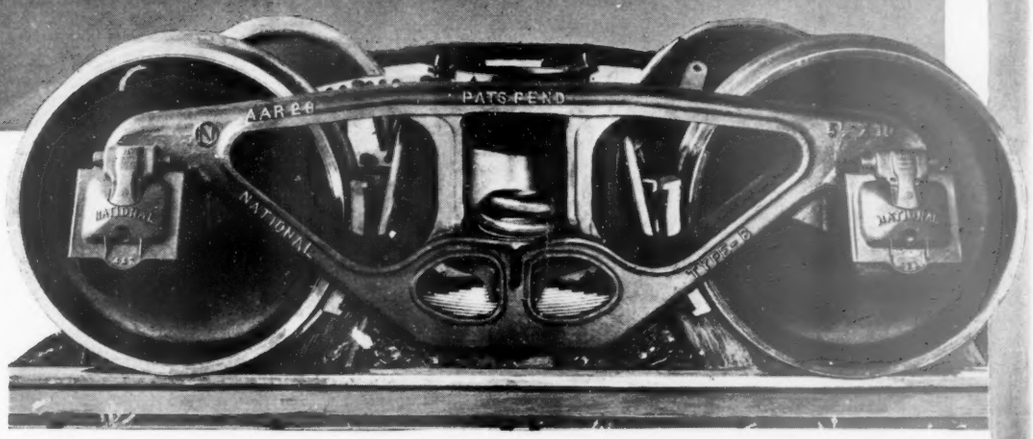
NATIONAL MALLEABLE AND STEEL CASTINGS CO.

General Offices: CLEVELAND, OHIO

Sales Offices: New York, Philadelphia, Chicago, St. Louis, San Francisco

Works: Cleveland, Chicago, Indianapolis, Sharon, Pa., Melrose Park, Ill.

Less MAINTENANCE
Less DEAD WEIGHT



26% of all railway operating expenses is charged to maintenance of equipment. Every decrease in this item means a larger net operating income. National Type B Trucks are skillfully and purposely designed to effect pronounced reductions in these maintenance of equipment charges.

Weights are considerably less — troublesome features have been eliminated—a host of improvements have been added — all of which renders National Type B Trucks unsurpassed in price — in serviceability — and in their outstanding money-making performance under every class of freight equipment.

16 POINTS OF NATIONAL SUPERIORITY

Spring Plank eliminated . . . Brake Beam Safety Ledges Cast Integral with Side Frames . . . Reduced number of parts . . . Weight of complete Truck reduced . . . Increased Revenue Load . . . Increased Spring Capacity . . . Oversolid Spring Protection . . . No Out-of-Position or Lost Springs . . . Longer Spring Life . . . Longitudinal Leaf Springs do not reduce side clearance . . . Flexible Vertically—No spring planks to twist . . . Spring Cushioned Lateral Motion . . . Journal Box Water Ledge reduces Hot Boxes . . . Quick Wheel Change . . . Lower Maintenance Expense . . . Lower First Cost.

NATIONAL
TYPE B TRUCKS

NATIONAL MALLEABLE AND STEEL CASTINGS CO.

General Offices: CLEVELAND, OHIO

Sales Offices: New York, Philadelphia, Chicago, St. Louis, San Francisco

Works: Cleveland, Chicago, Indianapolis, Sharon, Pa., Melrose Park, Ill.

Canadian Representatives: Railway and Power Engineering Corporation, Ltd., Toronto and Montreal

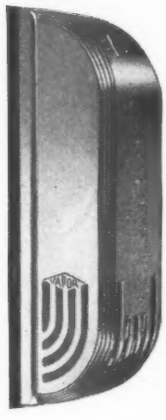
The Logical Outgrowth

OF THE VAPOR COMPANY'S THERMOSTATIC CONTROL

for passenger train heating was the development and perfection of AUTOMATIC CONTROLS FOR AIR CONDITIONING—for both heating and cooling.

VAPOR CONTROLS are adapted to and used with every type of air conditioning equipment. VAPOR THERMOSTATS for heating and for cooling maintain uniform inside temperatures at all times.

Its specialized development and service departments have enabled the Vapor Company to keep pace in every way with the rapid progress in transportation.



In this same spirit of co-operation, we shall endeavor to merit the continued confidence of our customers in developing further economies of those facilities which contribute to the comfort of their patrons.

VAPOR SYSTEM

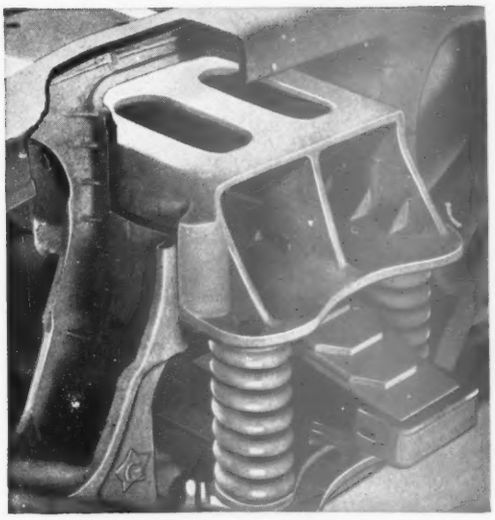
Everything for Passenger Train Temperature Regulation

VAPOR CAR HEATING CO., Inc.

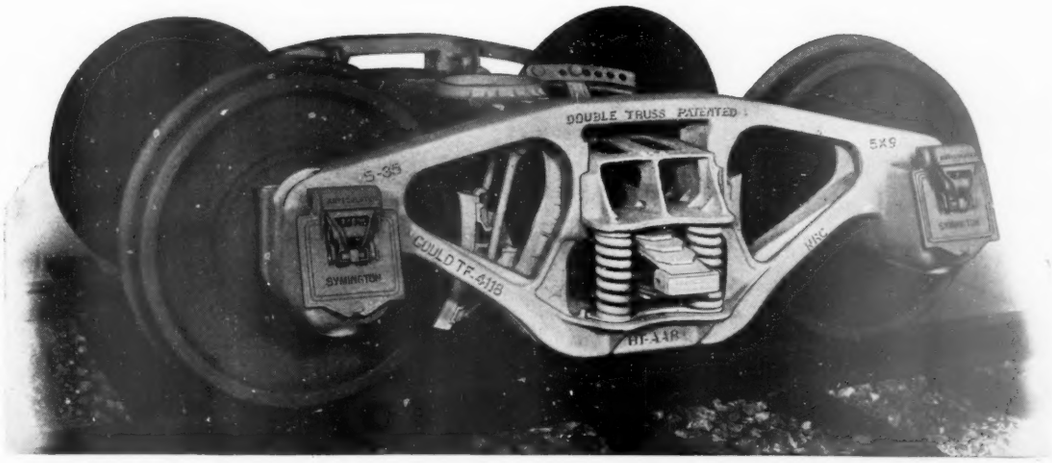
★ ★

RAILWAY EXCHANGE, CHICAGO, ILLINOIS

GOULD



DOUBLE TRUSS SELF-ALIGNING

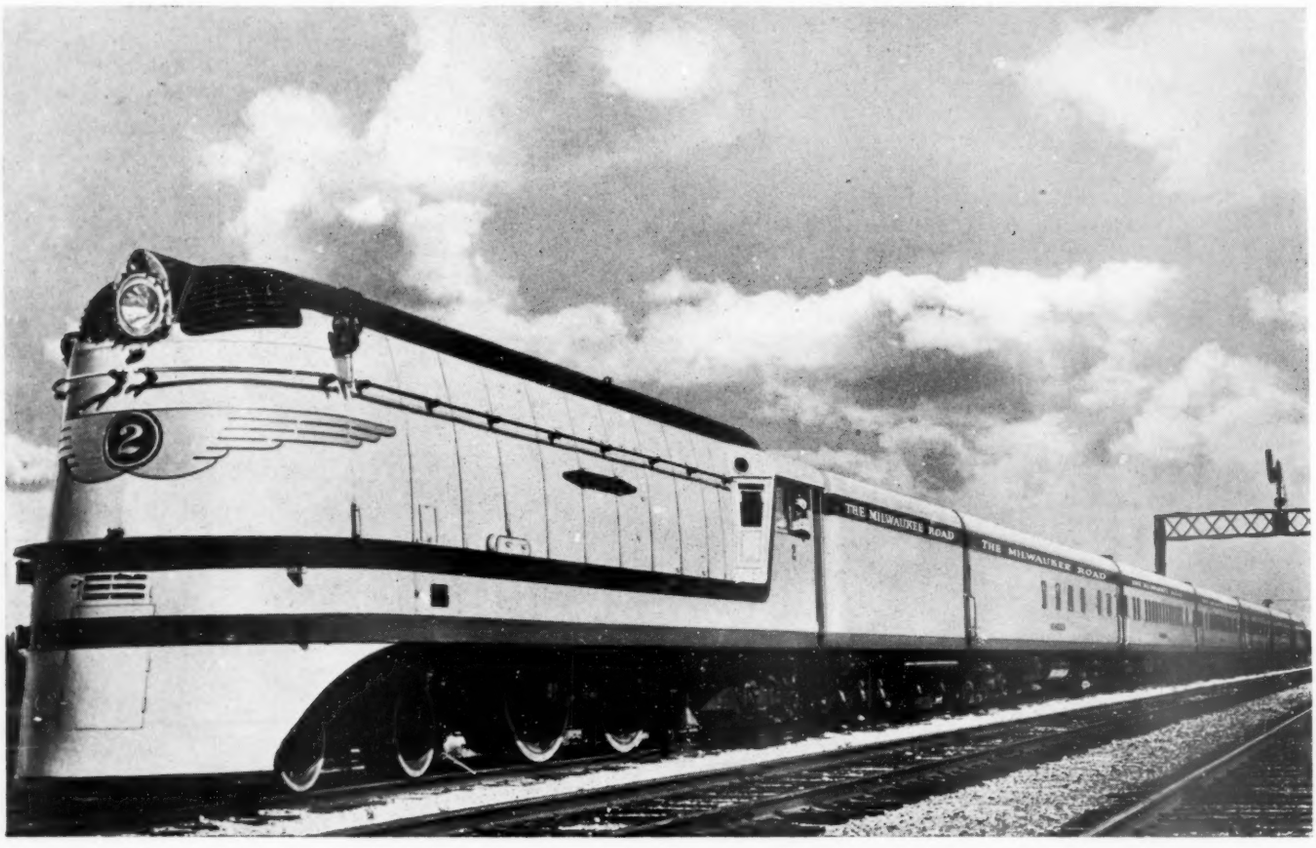


SPRING-PLANK-LESS

TRUCK

THE GOULD COUPLER COMPANY

NEW YORK Works: Depew, N. Y. CHICAGO



The FASTEST LOCOMOTIVE

DEMANDS THE BEST IN SPRINGS AND TIRES.

"RAILWAY" PRODUCTS

AT SPEEDS approaching 100 miles per hour, shocks are intensified and springs and tires are subjected to much heavier service than they are under ordinary conditions. • • "Railway" Springs and "Railway" Tires were selected for these new high-speed Milwaukee locomotives because quality, accuracy and skillful workmanship were imperative. • • "Railway" Products help this Milwaukee triumph to run smoothly and easily at exceptionally high speeds.

AMERICAN LOCOMOTIVE COMPANY
RAILWAY STEEL SPRING DIVISION
30 CHURCH STREET · NEW YORK · N.Y.

Equivalent to Ten Times Around the World

Without Boiler Repairs

Result of Bethlehem's handling of a boiler and firebox plate job

WHEN the Lehigh Valley Railroad ordered two locomotives with boiler and firebox elements of Bethlehem Nickel-Steel Plate a few years ago, it was somewhat of an experiment. Such impressive economies, however, were obtained with the first two locomotives that twenty-five additional units have since been built and put into service. The nickel-steel boiler and firebox plates occupied an important place among the refinements in design that resulted in an annual return of approximately 38 per cent on the investment. All of these plates were rolled by Bethlehem.

One of these twenty-seven locomotives has covered more than 257,000 miles—more than ten times the circumference of the world—without need for even minor repairs to either boiler or firebox. Records to date on all twenty-seven engines show promise of equally impressive results.

Performances like this are indicative of the results obtainable with Bethlehem Nickel-Steel Plates—even when the plate is subjected to severe stress due to the constant pounding and vibration of locomotive boiler service. They are effecting equally decided economies and operating improvements in many other fields of industry where their successful application has earned widespread approval.

Nickel-Steel Plates—like those supplied the Lehigh Valley Railroad—are but one of the many types of quality plates for special purposes produced by Bethlehem. They supplement the wide range of carbon steel plates which Bethlehem has been supplying to all branches of industry for many years. After careful study of specific problems, Bethlehem metallurgists gladly cooperate with users in recommending the most suitable grade of special or carbon steel plate to meet the requirements of the intended service.

BETHLEHEM STEEL COMPANY

BETHLEHEM STEEL

PERTINENT QUESTIONS

. . . ANSWERED BY A MAN

The amazing performances of Budd-built trains have revolutionized certain phases of railroading. A great many questions are continually being asked about them. Those asked most often were answered by Mr. Ralph Budd, President of the Chicago, Burlington & Quincy R. R. in his article in "Civil Engineering" for April, 1936.

How fast do the Zephyrs run?

On some parts of every trip, the Zephyrs run 90 to 95 miles an hour. The average speed of the Twin Zephyrs for the 431 miles between Chicago and St. Paul, including six stops, is 66.3 miles per hour. The Mark Twain Zephyr averages 40 miles per hour on its 442-mile round trip between St. Louis and Burlington, Iowa, making 60 stops.

Are they usually on time?

The four Budd-built trains on the Burlington System have made their schedules 94 per cent of the time, ever since entering regular daily service, including last winter, when all of them operated almost perfectly through extremely severe weather.

Have they shown any defects or weaknesses?

No structural weakness or defects of any kind have been disclosed upon continuous and careful inspection. Normal maintenance has been followed. Structurally, the cars have proved faultless. The three cars of the original Zephyr appear just as new as the fourth car, built 16 months later. The availability of the four trains has averaged 97 per cent.

Have they had any accidents?

The four Zephyrs have had nine grade-crossing accidents in the course of their million miles. Data indicates that they have had fewer accidents than other trains. In the only accident involving another train, the Zephyr sustained only a few scratches. One of the cars on the other train was derailed, while the front trucks of the Zephyr were derailed.

What happens when they strike, or are struck by, an automobile or truck?

The vehicles struck by Zephyr trains have been demolished or badly damaged. No damage has been done to the Zephyrs in any of the highway-crossing accidents beyond scratching and denting the stainless-steel covering, and the trains have always continued on their runs and made scheduled time. While the trains as a whole are light in weight, the forward truck of each train carries more weight than does the forward truck of our largest passenger locomotives. The shape and construction of the front tend to make it into a veritable battering ram, capable of lifting obstacles and throwing them into the clear.

EDWARD G. BUDD

RAILWAY DIVISION

ABOUT BUDD-BUILT TRAINS

WHO OPERATES THEM . . .

Have they been well patronized?

The patronage of the Zephyrs has exceeded expectations. Two of the trains — the first Zephyr between Lincoln, Omaha, and Kansas City, and the Mark Twain between Burlington and St. Louis — have been increased to four cars each. Since the enlargement, the seating capacity, 112 and 92 respectively, has been insufficient on a number of occasions. The Twin Zephyrs have three cars each, accommodating 70 passengers, plus 16 seats in the dining section, and their capacity has been insufficient many times. During July and August, 1935, approximately 5000 people could not be accommodated.

How much does it cost to operate them?

The cost of operation for 640,942 miles to December 31, 1935, was 31 cents per train-mile. This includes everything except depreciation and track maintenance and includes an accrual for power-plant maintenance. It seems safe to say that the cost of operation is substantially less than half that for a conventional train of the same capacity.

Are they as safe as other trains?

Experienced railway operating officials believe that stainless-steel trains of this type are the safest trains that can be built for high-speed operation. They are strong, remarkably free from vibration, have a low center of gravity, and are easy on the track. Furthermore, the great strength of the material used provides maximum protection in the event of any accident. Of course, the deceleration of high-speed trains is a major engineering problem. We know that the Zephyrs can be stopped in a much shorter distance than conventional trains running at the same speed. They are, incidentally, excellent snow-plows.

Do they ride comfortably?

It is difficult to get a direct comparison of the riding qualities of these trains with those of other trains because other trains seldom attain the speeds of the Zephyrs. Their articulated construction gives them certain marked advantages. There is no side motion at the couplings, and since the cars do not extend beyond the center of the articulated trucks, adjacent cars act in perfect unison. This feature, together with the low center of gravity, provides smooth and quiet performance at high speeds, especially on curves. Passengers comment on the fact that the starting and stopping are without any jerking or bumping.

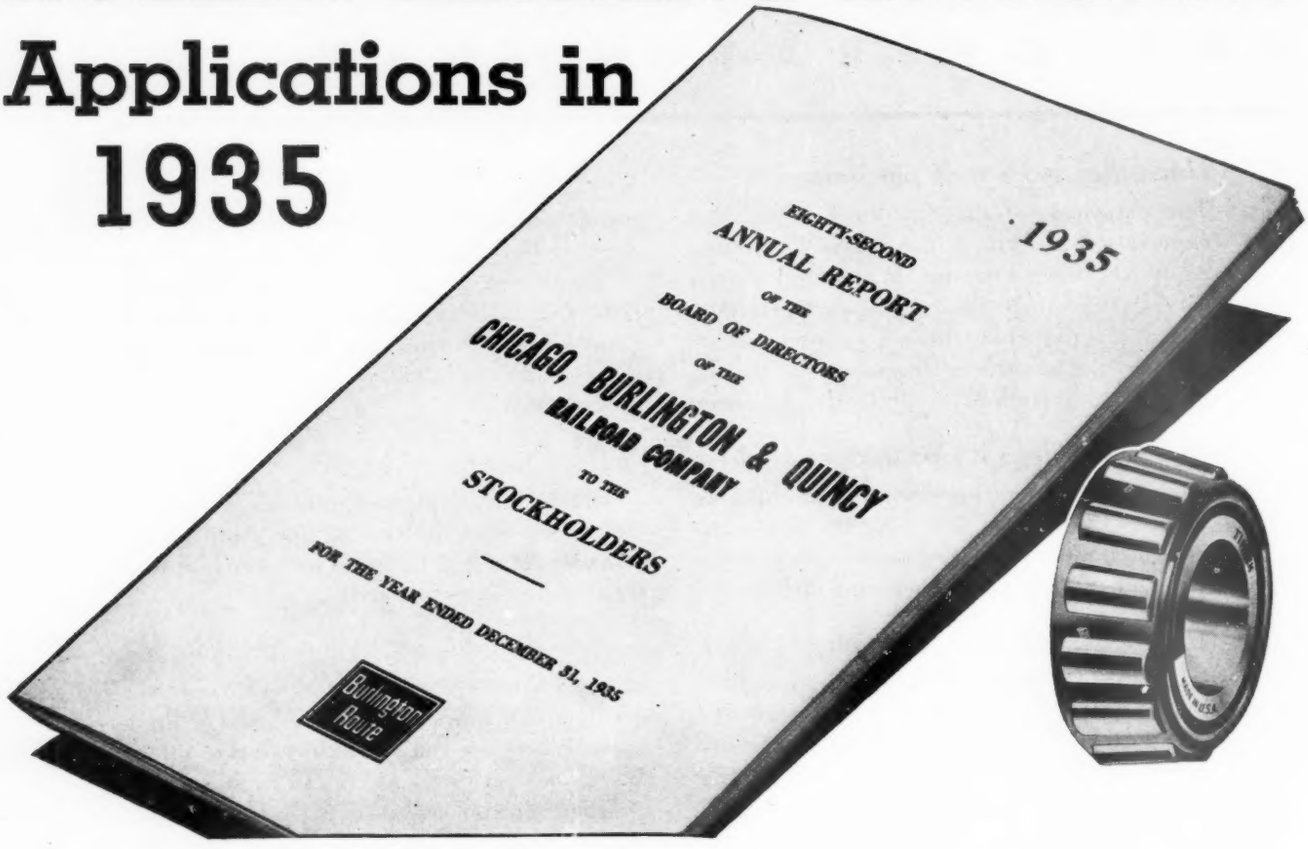
Now in construction for the Chicago, Burlington & Quincy are four more stainless-steel trains, two of ten cars and two of six cars. These will increase their fleet of light-weight trains to eight — with a daily mileage of 6000. These offer the strongest evidence of the Burlington's belief in the profit-making abilities of light-weight, stainless-steel trains — which can be constructed only by the "Shotweld" process.

BUDD METHODS SAFELY ELIMINATE DEAD-WEIGHT

MANUFACTURING CO.

PHILADELPHIA

The Burlington Reports on ROLLER BEARING Locomotive Applications in 1935



The following statements appear on pages 9 and 12 respectively of the Chicago, Burlington & Quincy Railroad Company's eighty-second annual report to stockholders:

PAGE 9. "The Texas type, 2-10-4 locomotive, which was equipped with roller bearings, disc wheels, 28-in. cylinders, for test in high speed freight service between Lincoln, Nebraska and Denver, Colorado, gave an excellent account of itself and during the year five additional locomotives were fitted up. These six engines are now handling four fast freight trains between Lincoln and Denver."

PAGE 12. "Continuing the usual program for safe and economical operation, improvements have been made to locomotives and cars as follows: Roller bearings applied to driving wheels, engine and tender trucks, disc wheels to main drivers of five M-4-A high speed locomotives.

"Roller Bearings applied to engine trucks of four B-1-A locomotives."

The roller bearings referred to in all cases are Timken Bearings and other locomotives are now being Timken-equipped.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TIMKEN *TAPERED ROLLER* **BEARINGS**

TIMKEN Reports to the Railroads on Timken Roller Bearing Applications to Locomotives

In Service and Under Construction

275 steam and electric locomotives *completely Timken-equipped on all axles—including driving axles.*

277 steam and electric locomotives Timken-equipped on all driving axles.

418 steam and electric locomotives with Timken-equipped engine trucks.

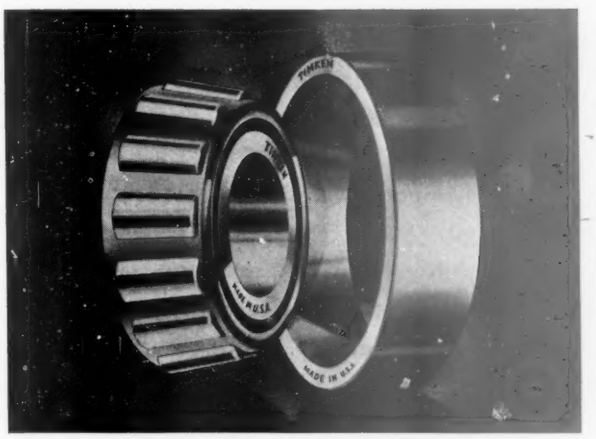
328 steam and electric locomotives with Timken-equipped trailer trucks.

445 steam locomotives with Timken-equipped tenders.

In all, there are 822 individual locomotives in service or under construction that are equipped with Timken Bearings in one or more positions.

Over 75% of all American high speed streamlined trains operate on Timken Bearings.

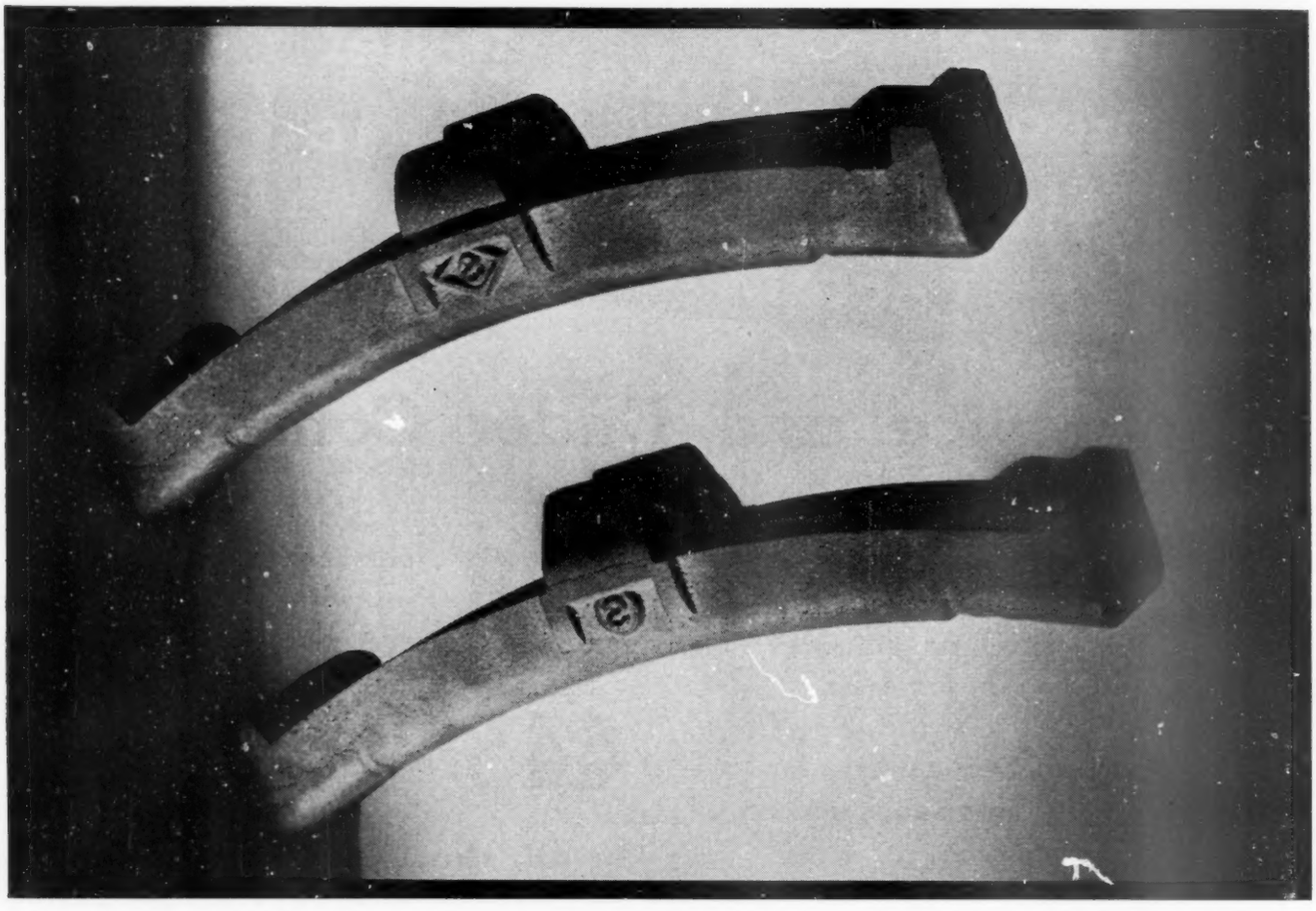
More Timken Bearings are used in American locomotives and rolling stock than all other anti-friction bearings combined.



THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TIMKEN TAPERED ROLLER BEARINGS

Can You Tell Which is Which?



These two freight car brake shoes look alike but there is a vast difference in them. Can you tell which one will last longer? Do you know how much longer? Do you know why?

Note this Statement—

"Much information has been gathered in respect to service obtained from brake shoes on roads whose records could be accepted as reliable. These have been studied and reveal the fact that the present plain chilled cast iron type of shoe, as shown on pages 88 and 89, Section "E" of the 1934 Manual, only meets present day requirements with exceptionally heavy loss, waste and unduly high net cost to the purchaser. The fact that a very large per cent of brake shoes in freight service are never worn out but fail in large numbers before much shoe wear has developed is sufficient in itself to suggest that improvements in shoe design are not only desirable, but necessary."

—From Circular No. D.V. 846-A
Association of American Railroads

← *The improvements called for in this report are now ready. See opposite page.*

And Can You Answer THIS One?

WHAT percentage of the freight car brake shoes on your equipment is removed broken with part missing, before they are anything like worn out?

Is it less than 12 per cent?

Data compiled for 9 Class I railroads by an impartial committee show that 53 per cent of freight car brake shoes are removed *at an average thickness of one inch* on account of being broken with part missing.

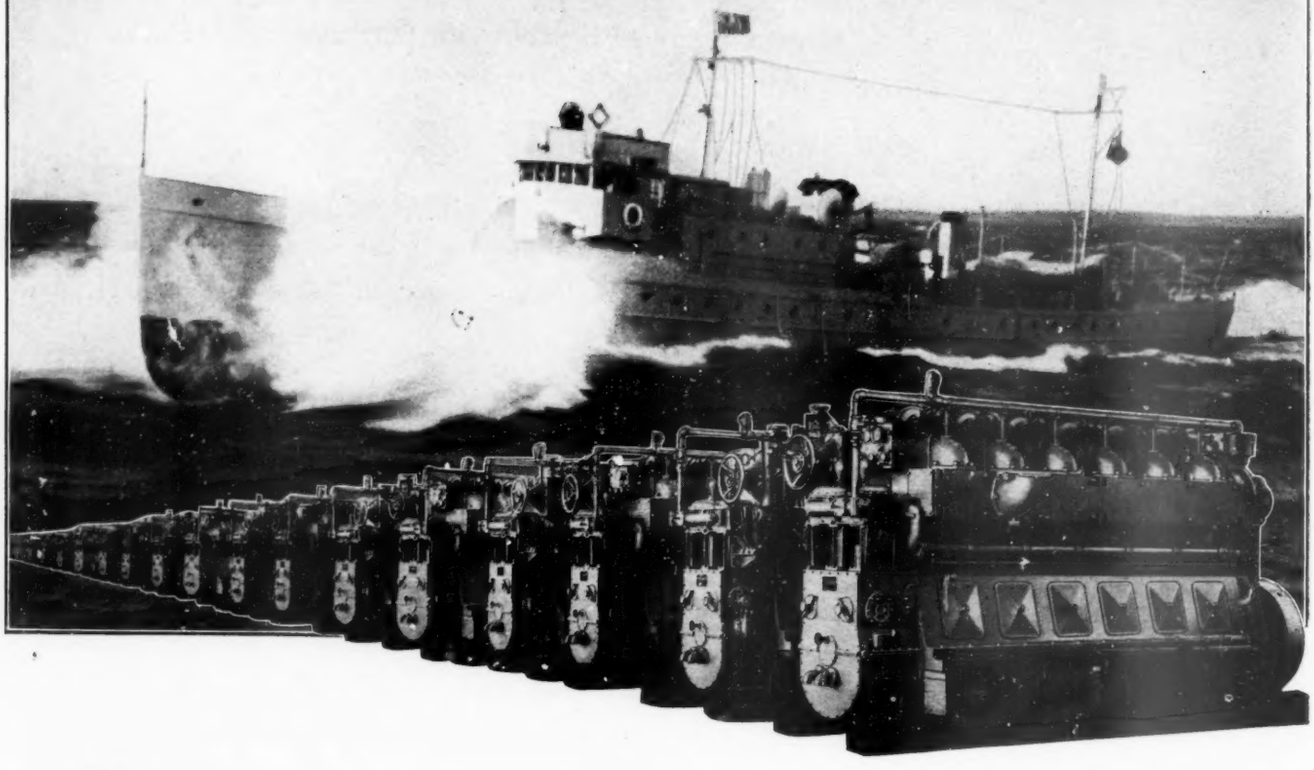
If your record isn't better than 12 per cent, or if you don't know just what the percentage of failure is on your lines, you will want to hear the inside story of a new brake shoe reinforcement which this company has developed.

This new shoe should reduce the number of freight car shoes to be purchased, stored, distributed, applied and removed approximately 25 per cent. It is one of the two shoes pictured on the opposite page. It *looks* like an ordinary shoe, but hidden inside is—

Well, ask our representative to tell you — and show you — just what *is* inside of the new Duplane reinforced shoe that is going to make it a money-saver for every road that adopts it.

THE AMERICAN BRAKE SHOE AND FOUNDRY COMPANY

WINTON comes to BANTAM



HERE is a string of thirty-six Winton Diesel Engines, 670 H.P. each, furnished recently for eighteen United States Coast Guard cutters. Each of these Winton Engines, like practically every other Diesel made, is equipped with Bantam Quill Roller Bearings.

500,000,000 QUILL ROLLERS SUPPLIED FOR AUTOMOTIVE USE

Well over a half billion precision quill rollers have been furnished by Bantam for automotive uses. They are used in 95% of the automobiles using quill bearings. Similarly, manufacturers of Diesel Engines for both automotive and marine uses are coming to Bantam. Experience has proved they can absolutely rely on us to solve any given bearing problem.

Considering this strong preference for Bantam Bearings—if you are one of the few we are not now serving—don't you feel it would be advisable to let us figure on your requirements?

BBB

THE BANTAM BALL BEARING CO.

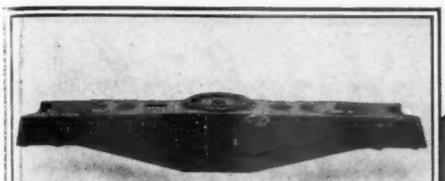
(SUBSIDIARY OF THE TORRINGTON CO.)

SOUTH BEND, INDIANA

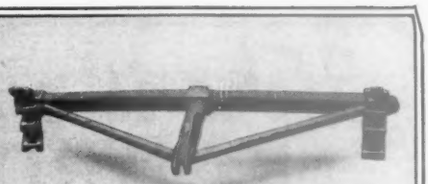
CHICAGO · PHILADELPHIA · TOLEDO · CLEVELAND · PITTSBURGH · WASHINGTON, D.C. · DETROIT · MILWAUKEE · NEW YORK · ROCHESTER, N.Y. · HARTFORD · NEW ORLEANS · SEATTLE · INDIANAPOLIS

In Canada — DOMINION ENGINEERING WORKS, LIMITED, MONTREAL

TAKE YOUR TOUGHEST BEARING JOB TO BANTAM



Truck Bolster

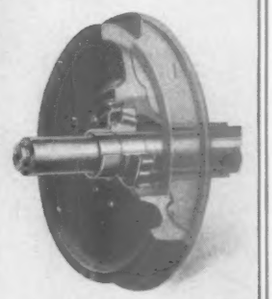


Ajax Brake Beam

THE American Steel Foundries for more than a third of a century has been developing cast steel devices, the use of which by the railroads has resulted in greater economy of operation.

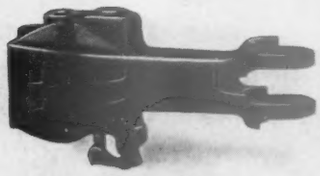
Long experience in the manufacture of uniformly good steel castings, the combined skill of metallurgists and foundrymen familiar with the needs of railway and industrial equipment, prompt shipment from strategically located plants, a world wide reputation for integrity and fair dealing — these are some of the things which have tended to make the American Steel Foundries a leader in the steel casting industry.

Davis Heavy Service Steel Wheel

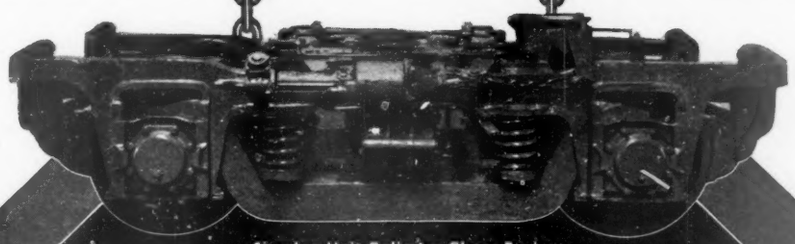


Roller Bearing Unit

Cast Steel Truck Side Frame



Type "E" Coupler



Simplex Unit Cylinder Clasp Brake

Coil & Elliptic Springs

The American Steel Foundries is proud to be serving a transportation industry that demands the best inventive and producing talent and that reaches out for devices that are new and better.

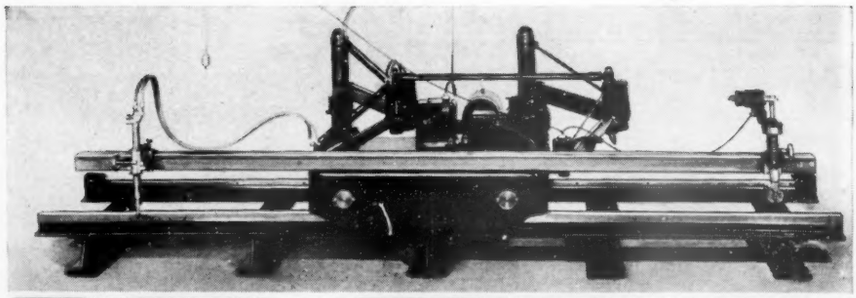
Janney Vertical Key Yoke

AMERICAN STEEL FOUNDRIES

NEW YORK CHICAGO ST. LOUIS

Here is one sure *way in which* RAILROADS *can economize!*

This is the TRAVOGRAPH, an AIRCO-DB gas cutting machine, which makes possible the production of locomotive and car parts at a fraction of the time and cost required to make them by any other method.



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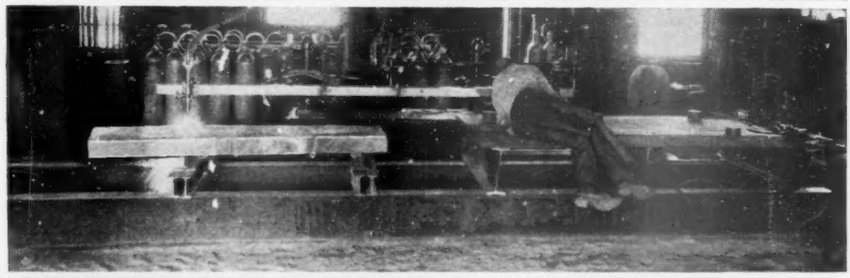
Here is the TRAVOGRAPH in action in the shops of a midwestern railroad which is capitalizing the great time, labor and money saving possibilities of this versatile machine.



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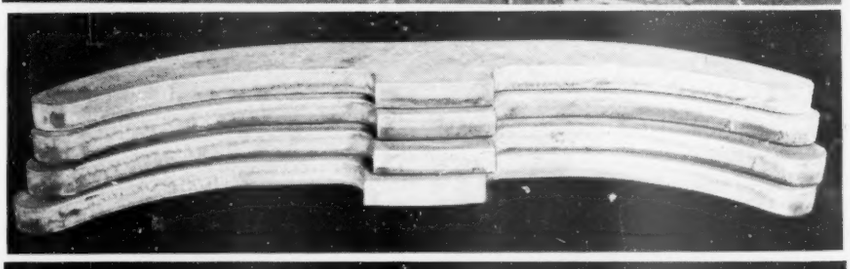
Here is a picture (unretouched) of the frame section which is being cut in the view above. A beautiful job . . . and done on the TRAVOGRAPH with amazing ease and speed.

•

Here is a stack of driver equalizers made in the same shop. Practically any shape can be cut on the TRAVOGRAPH over an area 4 feet 6 inches wide and unlimited in length.



•

Here is a picture of two trailer equalizers. Note the smooth face and clean, sharp edges of the cut — typical of TRAVOGRAPH work.

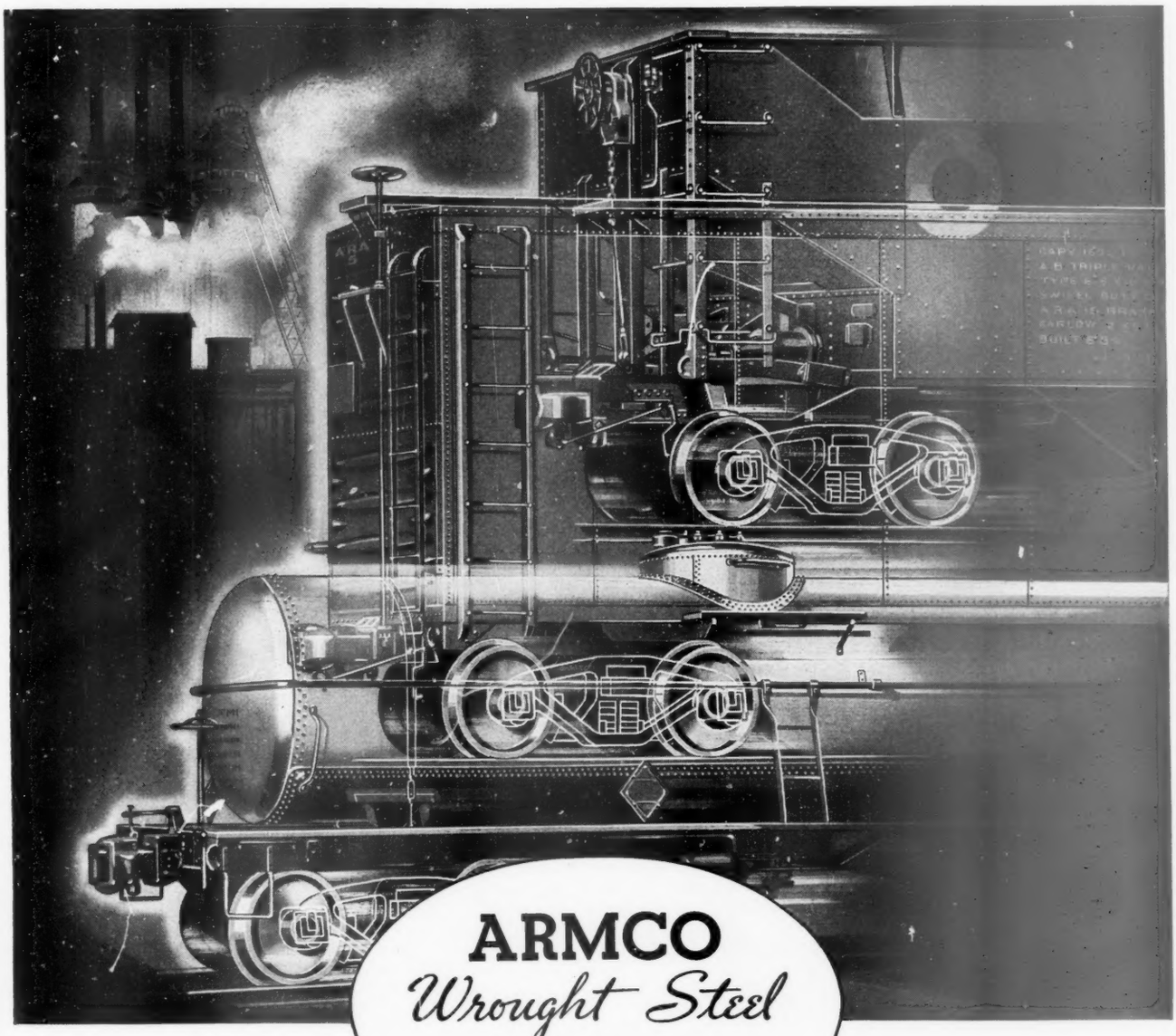
It is the combination of AIRCO Oxygen, Acetylene, AIRCO-DB Gas Cutting Machines and Apparatus and Engineering Assistance, that assures economy to AIRCO'S Railroad customers.

AIR REDUCTION
SALES COMPANY

General Offices: 60 East 42nd St., New York, N. Y.
DISTRICT OFFICES *and* DISTRIBUTING STATIONS in PRINCIPAL CITIES

A NATION-WIDE WELDING and CUTTING SUPPLY SERVICE

You'll be miles ahead with Armco One-Wears



ARMCO *Wrought Steel* WHEELS

PLUS MILEAGE—that's what every railroad executive and mechanical engineer wants from his wheels . . . and that's what he is assured of getting when his light equipment rolls on ARMCO ONE-WEAR WHEELS • They have the stuff it takes: hard, tough, uniform steel that wears down to the condemning limit slowly and economically • And ARMCO ONE-WEARS are just as safe as they are serviceable; the pains we take in making and processing the steel see to that. • Besides one-wear wheels, there are ARMCO TWO-WEARS, MULTIPLE-WEARS, and ARMCO HEAT-TREATED WHEELS—all members of a distinguished-service family of wrought steel wheels. • They're worth looking into from the profit-mileage point of view. May we help you determine the facts?

ARMCO RAILROAD SALES CO.
Subsidiary of The American Rolling Mill Co.
EXECUTIVE OFFICES: MIDDLETOWN, OHIO

DISTRICT OFFICES: CHICAGO CLEVELAND • DALLAS • DENVER DETROIT • MIDDLETOWN • NEW YORK • PHILADELPHIA • ST. LOUIS • SAN FRANCISCO

● When speed became a practical necessity, the railroads met the challenge in spite of depression. With eyes to the future and precedence thrown to the winds, they built the M-10,000, the Zephyrs, the Hiawatha, the Rebel, the Flying Yankee, the Comet, the Green Diamond.

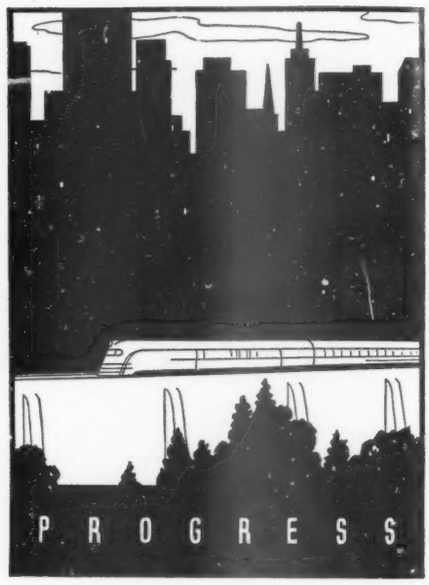
North, East, West and South, America speeds on fast, smooth, comfortable trains at schedules even exceeding 100 miles an hour.

Astonishing as has been the development of railroading in America, progress will go on and on. What has been done only guarantees what is to come. In 1900 who could forecast the electric engine cab signal, the automatic hump yard, the air conditioned coach, the flying streamliners? Who can forecast what the next few decades will bring forth?

• • •

In contemplating the future, American Hair & Felt Company and Dry-Zero Corporation are grateful for the close cooperation they have enjoyed with American and Canadian railroads for over half a century.

With unsurpassed resources for research and manufacturing they have been able to anticipate and aid in the solution of the many increasingly difficult insulation problems of modern railroad refrigerator and passenger cars.



HAIRINSUL — Standard refrigerator car insulation.

DRY-ZERO—The most efficient and lightest weight low temperature insulation known —standard for low temperature cars.

SALAMANDER — For over 30 years the standard insulation for passenger cars.

LIGHT-WEIGHT SALAMANDER — For insulating light-weight, high speed passenger cars.

CARINSUL — Made especially for insulating the letter board of passenger cars.

OZITE STANDARD HAIR FELT — Made by the genuine original platen or felted process and universally recognized as the highest standard of felted insulation.

LIGHT-WEIGHT AIR CONDITIONING HAIR FELT — For insulating air ducts.

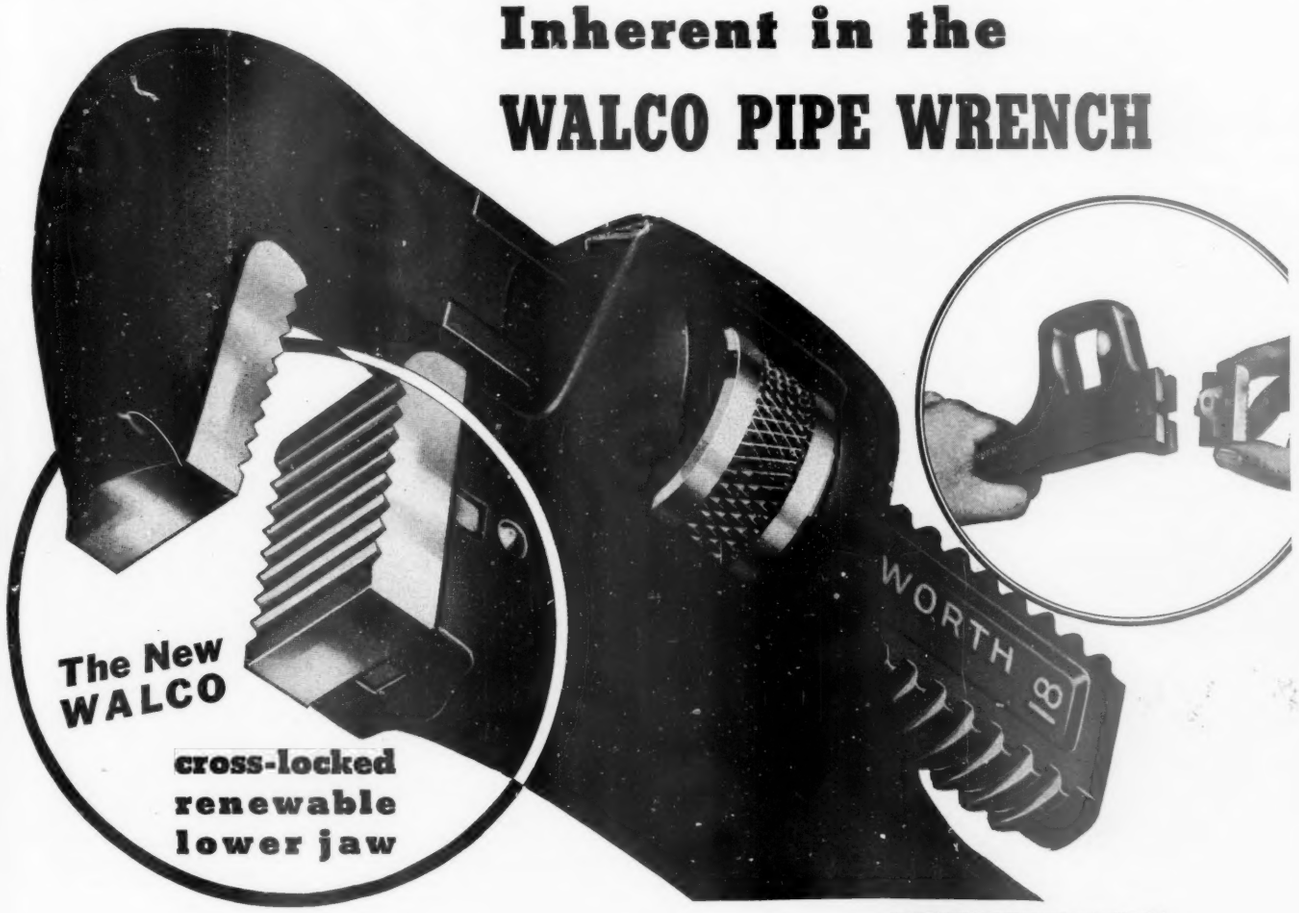
DRY-ZERO ECONOMY ICE BLANKET —For reducing ice meltage on platforms and in transit.

AMERICAN HAIR & FELT COMPANY • DRY-ZERO CORPORATION

(Railroad Division)

Merchandise Mart Chicago

SAFETY that is the result of STRENGTH Inherent in the WALCO PIPE WRENCH



Walco, the strongest pipe wrench made, is also the safest. All parts are of drop-forged steel, with integral forged housing—all parts are heat-treated. The cross-locked renewable lower jaw is proof against slip. Strength and safety are inherent qualities of this wrench. The Walco is built for heavy duty, severe abuse and long life.

It will last almost indefinitely as the teeth on the lower jaw, the focal point of wear, can be renewed when desired. No other pipe wrench combines all the features of the Walco . . . no other wrench is as economical in the long run.

PRE-PROVING WALWORTH QUALITY

This metallurgical microscope discloses and records the internal structure of metals, thus providing a check on the quality of product . . . in the forged state . . . after heat treatment . . . after subjection to service . . . or any simulated service condition.

This microscope is another of the many devices with which Walworth predicts the uniform high quality of its products. Field performance finds Walworth quality unsurpassed.

WALWORTH

VALVES FITTINGS and TOOLS
Backed by 94 Years' Service

WALWORTH COMPANY
60 EAST 42nd STREET, NEW YORK

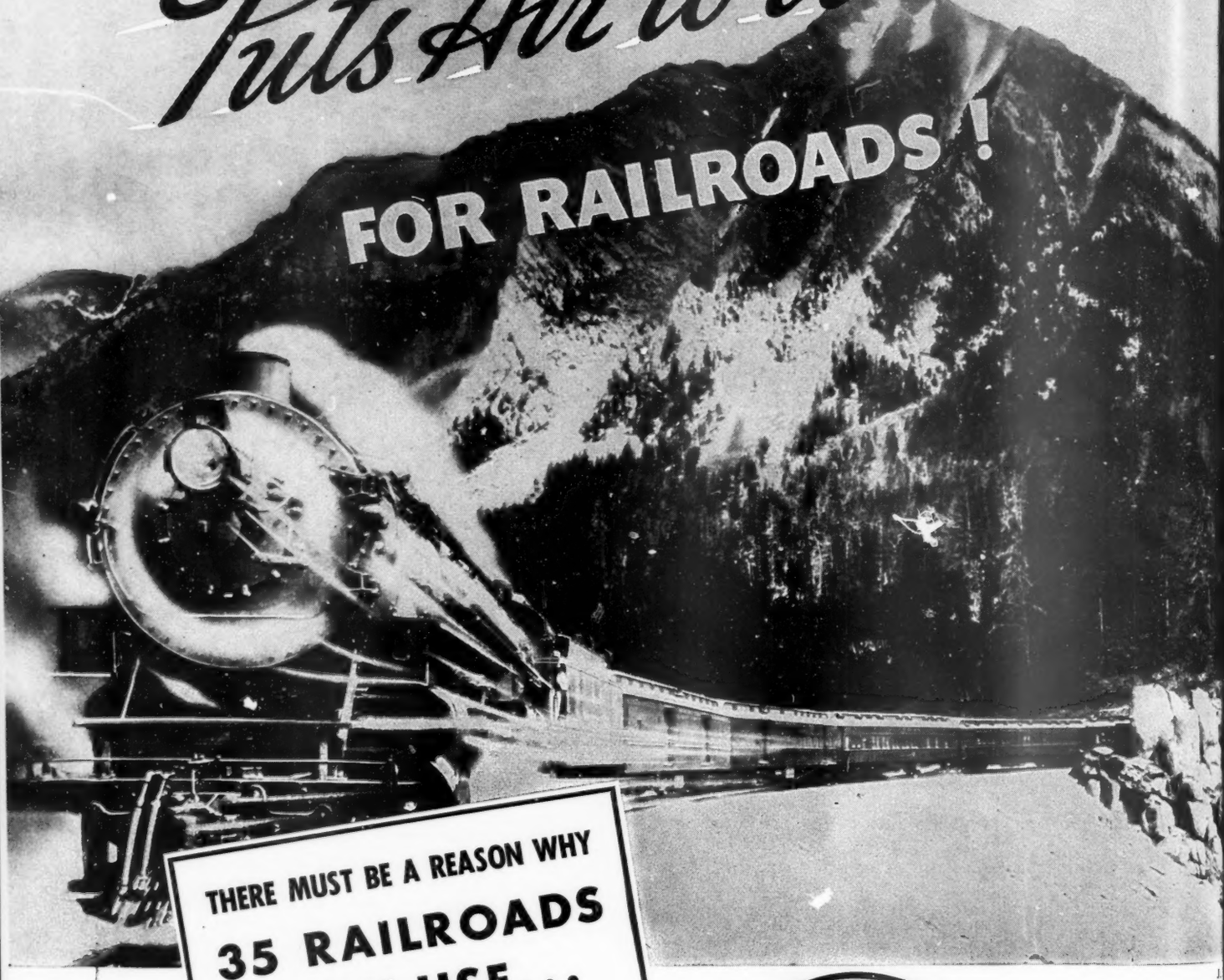
DISTRIBUTORS IN PRINCIPAL CITIES THROUGHOUT THE WORLD

Sturtevant

REG. U. S. PAT. OFF.

Puts Air to Work

FOR RAILROADS!



THERE MUST BE A REASON WHY

35 RAILROADS NOW USE...

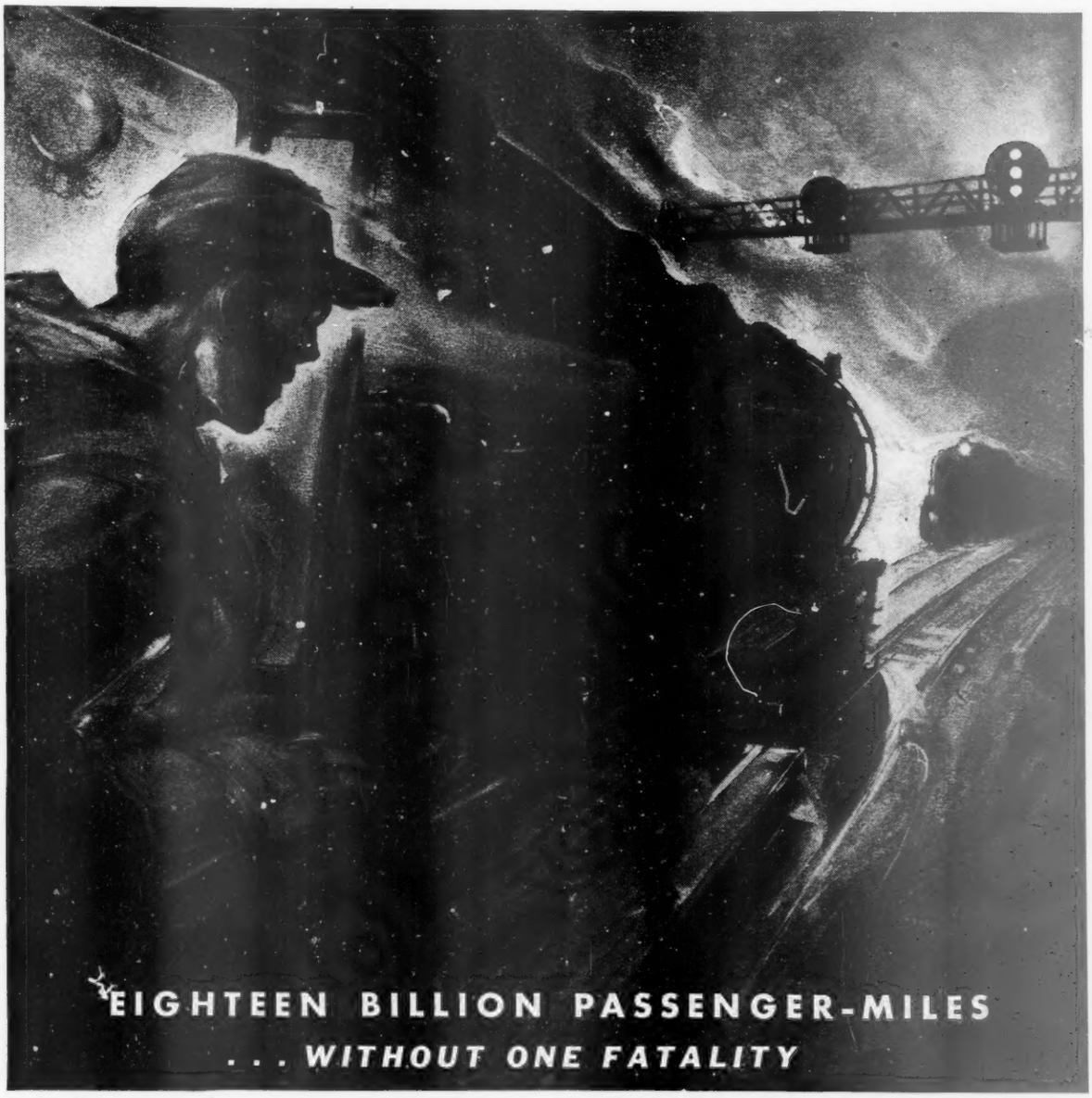
Sturtevant RAIL VANE TRADE MARK

AIR CONDITIONING UNITS OR SYSTEMS

B. F. STURTEVANT COMPANY **Main Office, HYDE PARK, BOSTON, MASS.**

Offices in 40 Cities. *Plants* at Hyde Park, Mass.; Framingham, Mass.; Camden, N. J.; Sturtevant, Wis.; Berkeley, Cal.; Galt, Ont.; B. F. Sturtevant Co. of Canada — Galt, Toronto, Montreal

PIONEERS IN AIR CONDITIONING FOR OVER 20 YEARS



EIGHTEEN BILLION PASSENGER-MILES
. . . WITHOUT ONE FATALITY

A magnificent record ...during 1935, men, women and children traveled a total of more than eighteen billion miles by rail without a single passenger fatality as the result of a train accident!

With trains running on faster schedules than ever before, this is a tribute alike to railroad men and to the dependability of all railroad equipment. It is proof, if any could be needed, that the railroads take no chances with the equipment upon which the safety of passengers depends. And it is significant that for operating the signals that make today's higher train speeds safe, as well as for car lighting, air conditioning and other vital services, many of the country's leading railroads depend on Exide Batteries.

With the experience of the railroads to guide you, there is no need to take chances when you require a new battery for your car. You *know* that Exides have proved their dependability for nearly half a century in many vital services. Is there any other battery that so thoroughly merits your confidence? Exides are priced for every car-owner. Look for the sign of the nearest Exide dealer—symbol of honest service.

THE ELECTRIC STORAGE BATTERY COMPANY
Philadelphia... *The World's Largest Manufacturers of Storage Batteries for Every Purpose*
Exide Batteries of Canada, Limited, Toronto

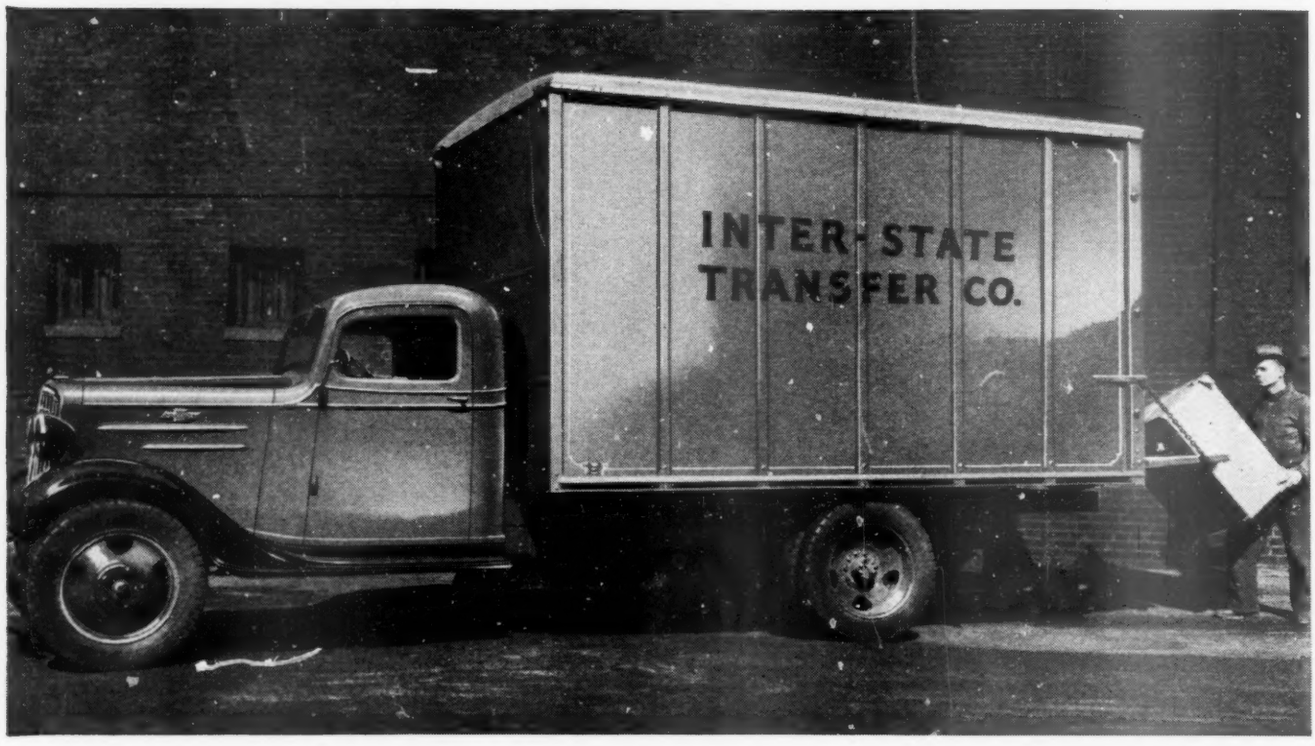
This advertisement appears in current issues of Collier's and The Saturday Evening Post. It is a message to the public, paying tribute to the safety of the nation's railroads.

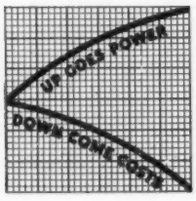
THE ELECTRIC STORAGE BATTERY COMPANY, PHILADELPHIA

Never before have trucks of lowest price offered

RAILWAY TRANSFER EQUIPMENT

of such great pulling power and economy





Railways who are using trucks for a wide variety of terminal transfer haulage are replacing costlier truck equipment with *powerful, low-priced* Chevrolet trucks!

New Chevrolet trucks, with the *greatest pulling power* of any trucks in the entire low-price range, have ample power for the heavier hauls, *plus* plenty of reserve power for emergency loads.

Lower investment and more flexible, faster service are only a part of Chevrolet truck economies. Chevrolet's High-Compression Valve-in-Head Engine has an unmatched record for big gasoline mileage and low oil consumption. New Perfected Hydraulic Brakes, a massive Full-Floating Rear Axle and rugged 4-Speed Transmission are all designed and built to give dependable, economical service—with *lowest* maintenance costs.

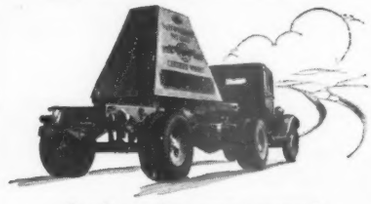
Inspect these new Chevrolet trucks! Ask your Chevrolet dealer for a trial demonstration on your own haulage jobs.

CHEVROLET MOTOR COMPANY, DETROIT, MICHIGAN

CHEVROLET TRUCKS

CHEVROLET TRUCKS

prove stamina and record-breaking economy in amazing coast-to-coast run



Look at this great record

Location of Test	Los Angeles to New York
Distance Traveled	3511.5 miles
Running Time	129 hours, 24 minutes
Average Speed	27.14 miles per hour
Gasoline Used	308.6 gallons
Gasoline, miles per gallon	11.378
Oil Consumption	2 quarts
Cost of Fuel	$57.59
Cost of Oil	$.67
Fuel and Oil (cost per mile)	$.016
Average cost per ton mile	$.00328
Water Consumption	1 gallon

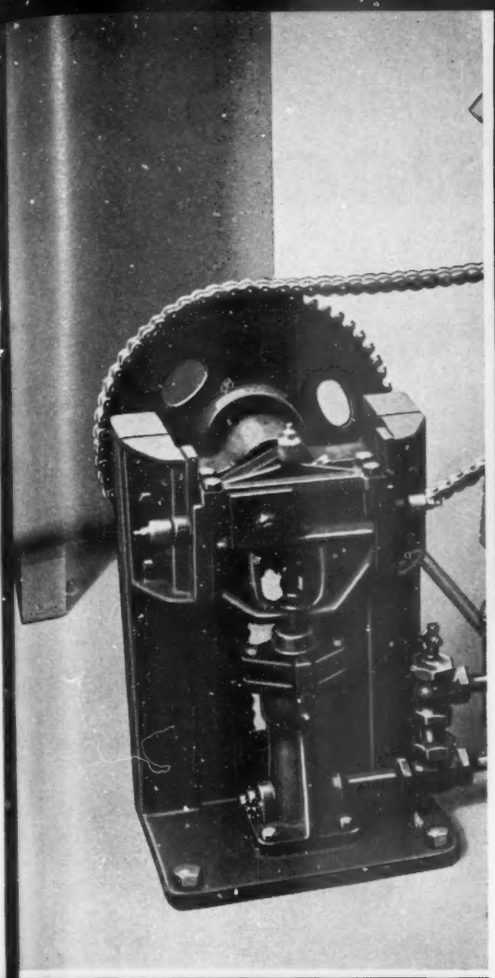
No mechanical failures

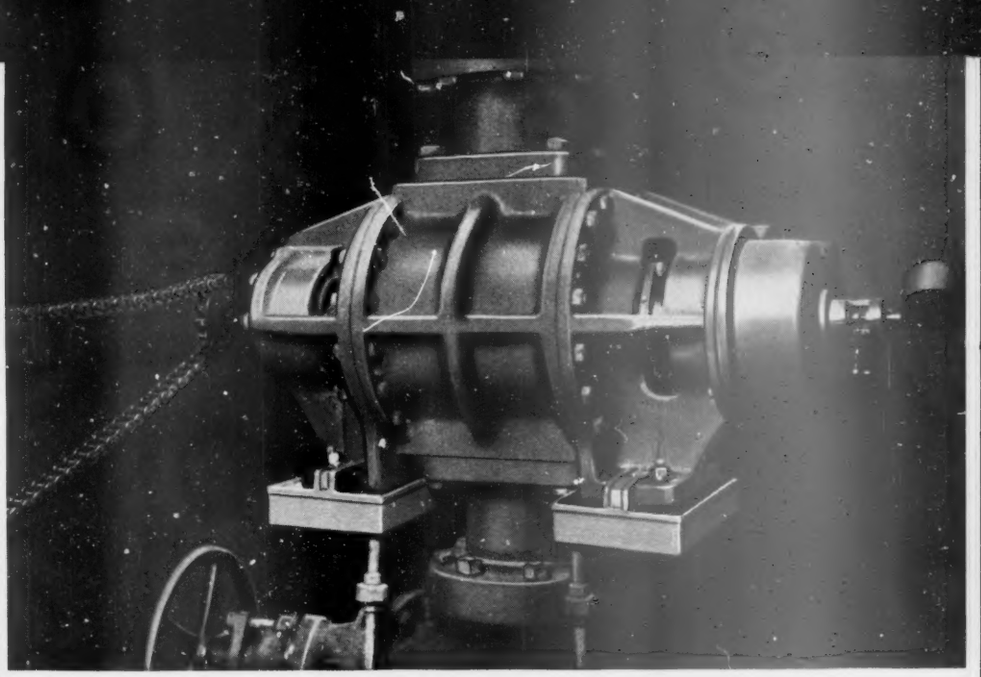
Entire test conducted under supervision of A.A.A. Contest Board—Sanction No. 3300.

CHEVROLET

FOR ECONOMICAL TRANSPORTATION

GENERAL MOTORS INSTALLMENT PLAN—MONTHLY PAYMENTS TO SUIT YOUR PURSE





Dearborn Water Motor *and* Chemical Pump

THE Dearborn Cycloidal Water Motor and Dearborn Chemical Pump are being used very successfully at water stations to inject exact proportions of Dearborn Treatment into the water.

Operation is automatic, being controlled by the rate of water flow. The water motor is simple in construction and is self-cleaning. There is no internal friction and no internal lubrication is required. The strongly built Dearborn Chemical Pump operates for extended periods without maintenance or replacements.

Dearborn Treating Plant Equipment employs both reciprocating and rotary chemical pumps operated by various power units. We furnish, also, mixing vats, filters, sludge removers and the switches needed.

Dearborn chemical and mechanical engineers survey each water station. They outline the best methods of application of Dearborn Treatment and recommend the type of mechanical equipment most suitable for the case.

Dearborn Methods correct troublesome water conditions efficiently and economically. Surveys and recommendations are without charge.

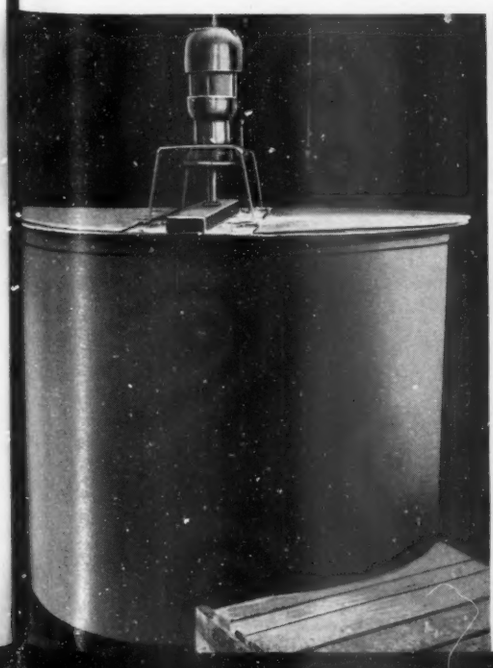
Dearborn

TRADE MARK REGISTERED

NO-O X-ID prevents rust throughout railway service. Ask about savings under the NO-O X-ID Plan for Bridge Maintenance.

DEARBORN CHEMICAL COMPANY

310 S. MICHIGAN AVE.	205 E. 42nd St.	2454 Dundas St. W.
CHICAGO	NEW YORK	TORONTO



Improved Engineering

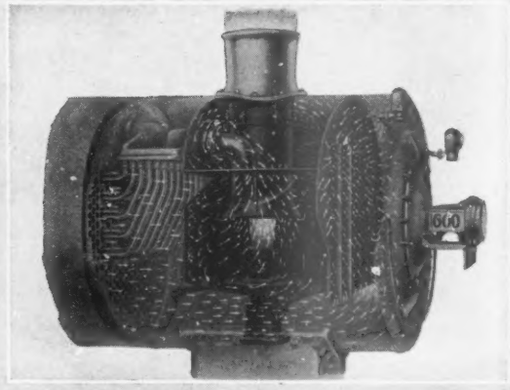
NICHOLSON THERMIC SYPHONS

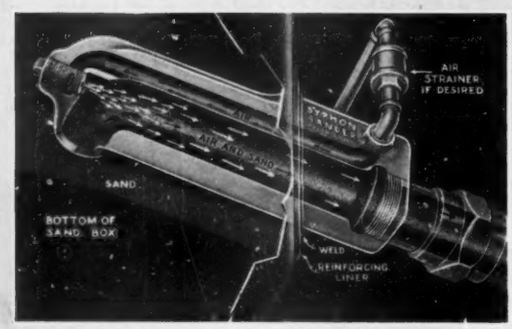
15,922 Syphons have been applied to 7,273 Locomotives on 162 Railroads.

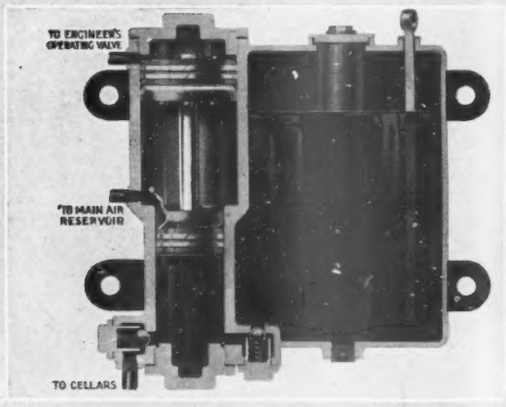
In general use throughout the world.

CYCLONE FRONT ENDS

The cyclonic movement of the gases and cinders breaks up and quenches the sparks without use of netting, improves draft with reduced back pressure and permits use of semi-bituminous or lignite coal without sparks. Now in service on more than 800 locomotives.







SYPHON SANDERS

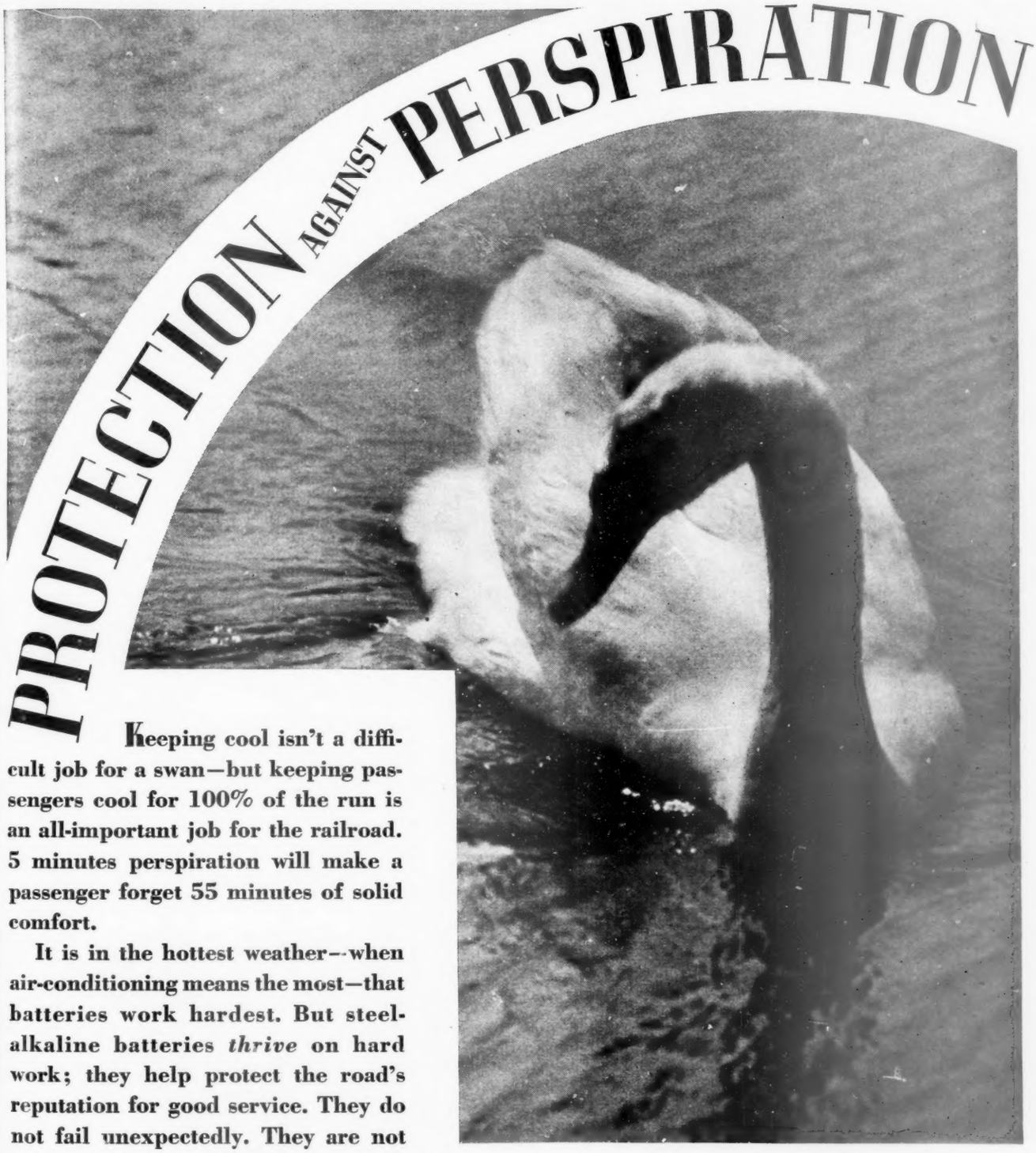
Simple—No Traps—No Pockets and No Leaking Joints to Cause Moisture Troubles—Positive Action—Trouble Proof—Wear Proof—No Periodical Maintenance—No Repair Parts Required. Can Be Operated With Any Style of Cab Valve—Easily Installed in the Roundhouse.

CHRISTY PNEUMATIC LUBRICATORS

Manually operated from cab pneumatic systems supplying oil under pressure to engine and trailer truck cellars. Prevent delays due to hot boxes and insure continuous lubrication with minimum attention.

LOCOMOTIVE FIREBOX COMPANY

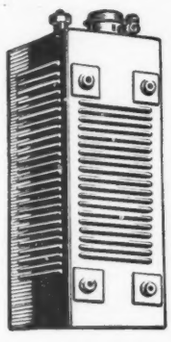
NEW YORK CHICAGO MONTREAL



PROTECTION AGAINST PERSPIRATION

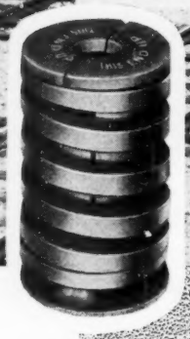
Keeping cool isn't a difficult job for a swan—but keeping passengers cool for 100% of the run is an all-important job for the railroad. 5 minutes perspiration will make a passenger forget 55 minutes of solid comfort.

It is in the hottest weather—when air-conditioning means the most—that batteries work hardest. But steel-alkaline batteries *thrive* on hard work; they help protect the road's reputation for good service. They do not fail unexpectedly. They are not subject to the same limitations as ordinary batteries. Their performance is predictable. They protect the road's big investment in air-conditioning equipment. Remember, though, that the only steel-alkaline battery made in the United States is the Edison; all others are lead-acid.



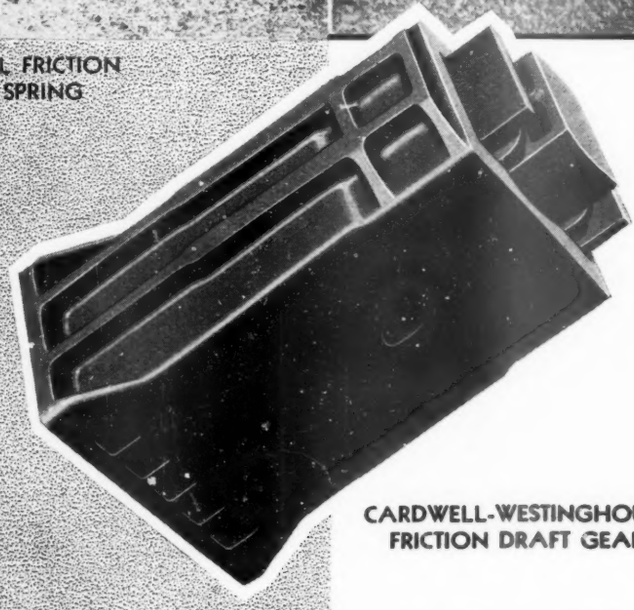
EDISON Storage BATTERY

DIVISION OF THOMAS A. EDISON, INC., WEST ORANGE, NEW JERSEY



CARDWELL FRICTION
TRUCK SPRING

TRUCK SPRING
NEST ASSEMBLY



CARDWELL-WESTINGHOUSE
FRICTION DRAFT GEAR

CARDWELL WESTINGHOUSE CO · CHICAGO

CANADIAN CARDWELL CO., LTD., MONTREAL

Oxweld Railroad Service procedure for hard-facing the crusher jaws of stoker housings increases the life of these parts several times.

Standardize on OXWELDING *for building-up worn Stoker Screws and Housings*

● Stoker screws worn in service can be quickly restored to superior working condition through building up the worn surfaces by the oxy-acetylene process. Oxweld Railroad Service procedure for performing this profitable application has been carefully perfected and should be closely followed for greatest benefits.

Like hundreds of other Oxweld welding and cutting practices, on which many important railroads have standardized, this job is aiding Oxweld contract customers to save money by avoiding replacements and maintenance.

Through almost a quarter of a century The Oxweld Railroad Service Company has served the welding and cutting needs of the majority of the Class I railroads.

OXWELD RAILROAD SERVICE

THE OXWELD RAILROAD SERVICE COMPANY
Unit of Union Carbide and Carbon Corporation

New York: Carbide and Carbon Building

UCC

Chicago: Carbide and Carbon Building

Higher Safety Factor Through Yoloy Steel

DEMONSTRATED BY TESTS OF OVERHEAD TROLLEY-TRACKS

¼ - INCH DEFLECTION AT 3222 LBS.
YOLOY OF SAME GAUGE AND SECTION

FAILURE AT 1672 LBS.
HOT ROLLED OPEN HEARTH STEEL

Two identical sections of 16-gauge track, one of hot-rolled open hearth steel, the other of YOLOY, were subjected to overloading tests by Coburn Trolley Track Mfg. Co., Holyoke, Mass. The upper 3-foot length stood up under a load of five times its rated capacity (300 lbs. on a 3-foot span) and finally failed under a load of 1672 lbs. The lower length....YOLOY....showed a permanent deflection of only ¼-inch under 3222 lbs., at which weight the supporting members failed and prevented further increase in the load.

YOLOY, more economical to fabricate, and making possible radical increases in permissible unit stresses, is the answer to scores of conditions where only a high factor of safety can protect against the ever-present danger of human carelessness.

With YOLOY your engineers have greater latitude in design, permitting them to develop designs which, up till now, have not been practical.

YOLOY'S many times increased resistance to corrosion makes it an effective substitute for more expensive materials. Its increased ductility and high weldability offer opportunities for economies in production.

Investigate YOLOY. Its unique combination of properties can mean a better product at a lower ultimate cost.

Send for YOLOY Bulletin.

THE YOUNGSTOWN SHEET AND TUBE COMPANY
Manufacturers of Carbon and Alloy Steels
General Offices - - - YOUNGSTOWN, OHIO

Tubular Products; Sheets; Plates; Tin Plate; Bars; Rods; Wire; Nails; Conduit; Unions; Tie Plates and Spikes.

604

YOLOY YOUNGSTOWN STEEL

Yoloy is furnished in sheets, strip, plates, bars, shapes, manufacturer's and welding wire, seamless and electric weld pipe.

HIGH-TENSILE STEEL
YOLOY

EDGEWATER

FORMULA FOR A GOOD DRAFT GEAR

$S_T + (C_a + S_m + E) \times E_{RS} = SR$

S_T = **STURDINESS.**
C_a = **High Capacity**
S_m = **Smooth Action**
E = **Long Endurance**
E_{RS} = **Edgewater Ring Spring**

SR = SUPERLATIVE RESULTS.

Ⓔ

RING SPRING DRAFT GEAR

Edgewater Type B-32-KA Certified by Association of American Railroads

EDGEWATER STEEL COMPANY

PITTSBURGH, PENNSYLVANIA

Sales Offices: ATLANTA BALTIMORE BOSTON CHICAGO KANSAS CITY LOUISVILLE NEW YORK PHILADELPHIA PORTLAND ST. LOUIS ST. PAUL SAN FRANCISCO SEATTLE WASHINGTON

Complete

CAR SERVICE TO THE RAILROADS

WE

Design freight cars
Build freight cars
To any railroad specifications

WE

Lease freight cars
Operate freight cars
For any liquid or refrigerated lading

WE

Also operate the world's largest terminals for storage of bulk liquids at several tidewater ports.

Our Service Helps Shippers to Economize

GATX GENERAL AMERICAN

GENERAL AMERICAN TRANSPORTATION CORP.

135 SOUTH LA SALLE ST., CHICAGO

Dollars and Sense

REASONS WHY CELOTEX SETS THE STANDARD FOR REFRIGERATOR CAR INSULATION . . .

● It is significant that railway purchasing departments, operating on a "show me basis," have standardized on Celotex Cane Fibre Board for refrigerator car insulation. Their choice has been determined by the following facts demonstrated through actual use and investigation:

1 *Celotex increases the payload*
Celotex self-sustaining insulation weighs about one-third as much as lumber. Thus it decreases the unit cost of hauling the payload.

2 *Celotex builds as it insulates*
Celotex is strong. It is not an additional insulating material to be purchased, but an integral part of the car construction that adds bracing strength to the car wall and, because of its shock-absorbing qualities, it protects the whole car structure from the torsional strain of car weaving. It is resilient and takes very little permanent set.

3 *Celotex insulation values are permanent*
Celotex is nailed securely in position, covering posts and bracing from top to bottom of the car frame. It cannot settle or get out of position, and as it resists moisture, it maintains its insulation values.

4 *Celotex is inexpensive*
This low-priced insulation is economical to use because it functions in place of structural material which would otherwise have to be purchased if another form of insulation were employed.

5 *Celotex is installed economically*
The light, strong Celotex Cane Insulating Boards may be sawed and nailed in position just like ordinary lumber by ordinary workmen in rapid time.

Celotex is supplied in board form of any size specified by the car builder. When Celotex replaces blind siding, it furnishes an extra ½ inch of good insulation, strengthens the car, and saves much non-pay dead weight. As many layers may be added as needed to attain the exact insulation value desired.

THE CELOTEX CORPORATION, 919 N. Michigan Ave., Chicago, Illinois
Sales Distributors in Principal Cities Throughout the World

CELOTEX
BRAND
INSULATING CANE BOARD
REG. U. S. PAT. OFF.

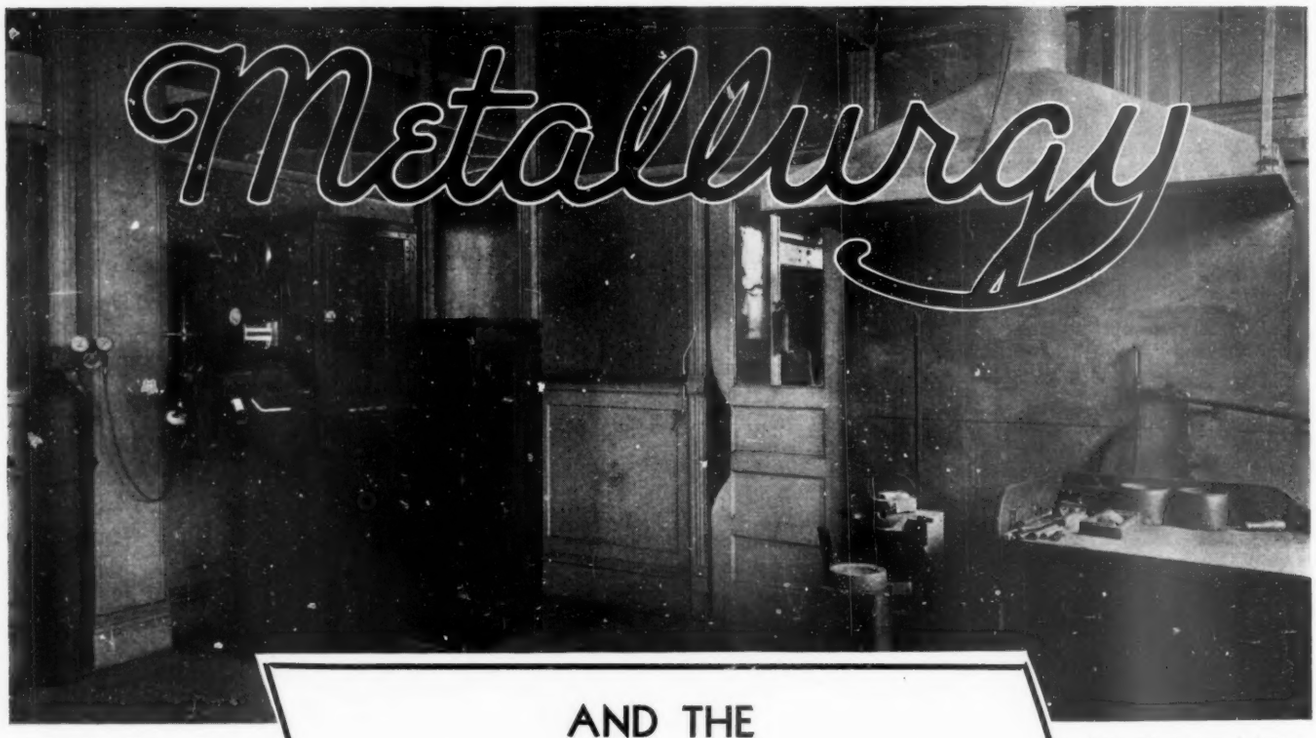
BUILDS • PROTECTS • INSULATES • DECORATES • SUBDUES NOISE

FREE COMPARATIVE COST AND INSULATION VALUE FIGURES

The Celotex Corporation will make for any railroad or any car builder comparative drawings and calculations showing weights, costs, and insulation value of any refrigerator car construction—old or new.

Celotex Cane Fibre Products are manufactured under the Ferox Process (patented) and resist damage by Fungus Growth, Dry Rot and Termites (white ants). Look for the brand name. Accept no substitutes.

CELOTEX PRODUCTS: Celotex Building Board • Celotex Lath • Celotex Sheathing Board • Celotex Tile Board • Celotex Hardboard • Celotex Panel Board • Celotex Studio Board • Celotex Hardboard Tile • Celotex Rock-Wool • Celotex Ornaments and Mouldings • Celotex Roof Insulation • Celotex Vaporproofed Roof Insulation • Celotex Vaporproofed Low Temperature Insulation • C-X Wall Boards • Acousti-Celotex Sound Absorbing Tile.



High Frequency Induction Melting Furnace for Experimental Melts.

AND THE
CHILLED CAR WHEEL

Metallurgical research quite properly begins with the raw materials, the melting of the metal, and its final chemical composition. The research laboratory of the Association of Manufacturers of Chilled Car Wheels includes a well-equipped chemical laboratory and experimental melting equipment. To date over 1600 different experimental melts have been made to study the influence of the usual elements and special alloys on the physical properties of wheel iron.

MEMBERS

Albany Car Wheel Co.
American Car & Fdry. Co.
Bass Fdry. & Machine Co.
Canada Iron Foundries, Ltd.
Canadian Car & Fdry. Co.
Central Car Wheel Co.
Cleveland Production Co.
Dominion Wheel & Fdries., Ltd.
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Lobdell Car Wheel Co.
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Maryland Car Wheel Co.
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Pullman-Standard Car Mfg. Co.
Ramapo Fdry. & Wheel Works
Reading Car Wheel Co.
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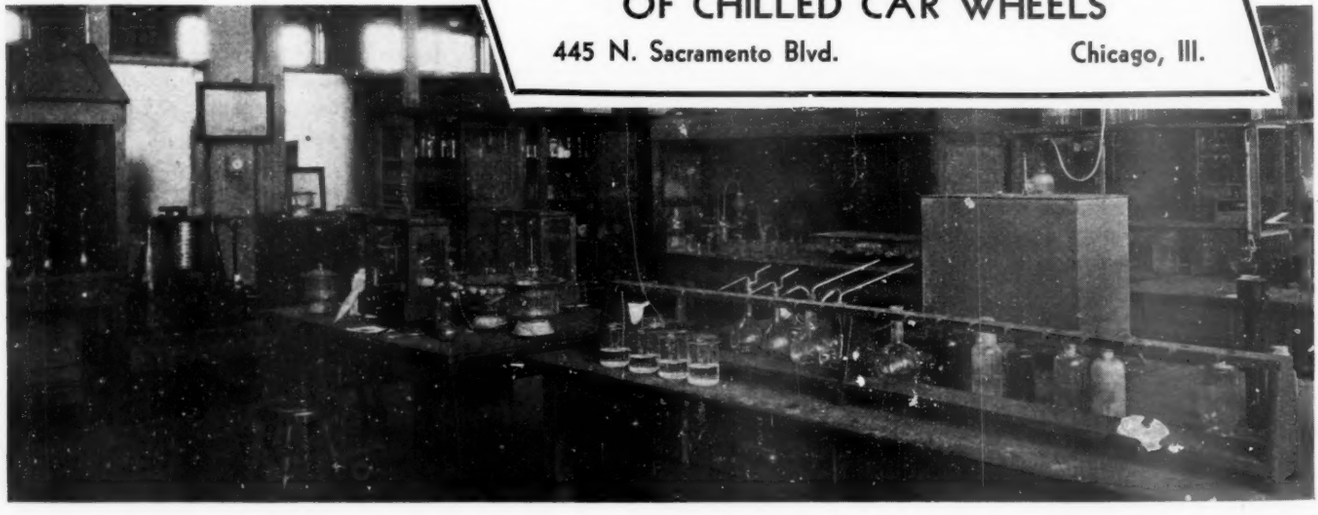
Tredegar Iron Works

Chemical Laboratory



ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS

445 N. Sacramento Blvd. Chicago, Ill.

THREE WAYS TO PROFIT
from Machine-Shop Modernization

A QUARTER of a million dollars' worth of modernization—at the Reading's locomotive shops. It took a lot of farsightedness to undertake such a program. That was last year. Already the resulting savings are showing a very attractive return on the investment—and these savings are expected to increase.

Here are the three ways in which you profit from modern electrically driven machine tools. You will cut power cost; you will decrease maintenance; and you will save time and get more work done because of greater ease of operation. Carefully designed electric equipment meets the demands of faster operating cycles, fewer setting-up operations, and more convenient control.

General Electric furnished a substantial portion of the control equipments and motors for the new machine tools now in service in the Reading (Pa.) shops. General Electric's co-operation with machine-tool builders and its long experience as a large user of machine tools enable us to furnish the correct motor and control for every operating condition.

For all road, shop, and yard operations in which electricity plays a part, General Electric furnishes equipment designed to meet the needs of railroad service. Our experienced engineers and nation-wide organization assure you of real service. General Electric, Schenectady, N. Y.

Typical installation of G-E motor and control—the right combination for a profit-building installation

IMPROVED BUSINESS WARRANTS MODERN EQUIPMENT

GENERAL ELECTRIC

96-230

GRIFFIN WHEEL COMPANY

THE GRIFFIN HEAT TREATED WHEEL

REFINED METAL
INCREASED STRENGTH BY STATIC TEST
INCREASED STRENGTH BY THERMAL TEST
ELIMINATION OF ALL INTERNAL STRESSES
DEEPER CHILL
GREATER WEARING VALUE
LONGER LIFE

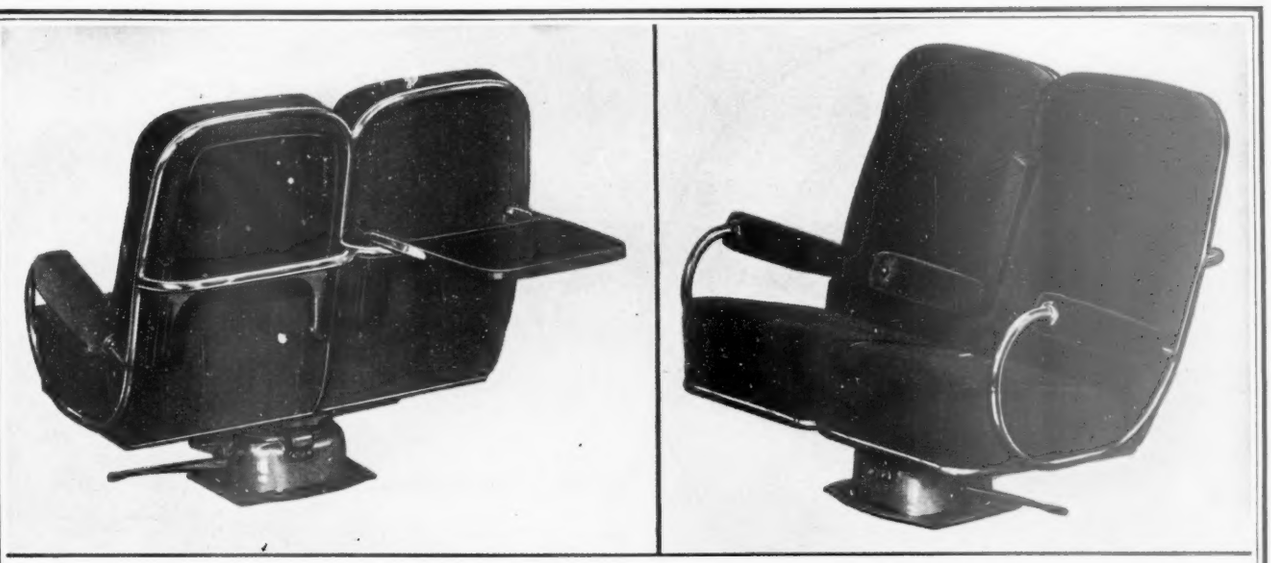
THE FOOD SUPPLY OF THE NATION IS CARRIED ON CHILLED TREAD WHEELS

GRIFFIN WHEEL COMPANY

410 NORTH MICHIGAN AVENUE CHICAGO, ILLINOIS

Plants

Chicago	Boston	Cincinnati	Kansas City	Denver	Los Angeles
Detroit	Cleveland	St. Paul	Council Bluffs	Salt Lake City	Tacoma



THE NEW 180 PSS, LATEST ADDITION TO THE HEYWOOD-WAKEFIELD LINE. Designed by Raymond Loewy, foremost modernist, for use in renovation experiments on the Pennsylvania, the 180 PSS has class, color, and all the comforts of home. *Note serving tray* which folds into back of forward seat when not in use.

THEY'LL ADD *Color* AND *Comfort* TO PENNSY COACHES

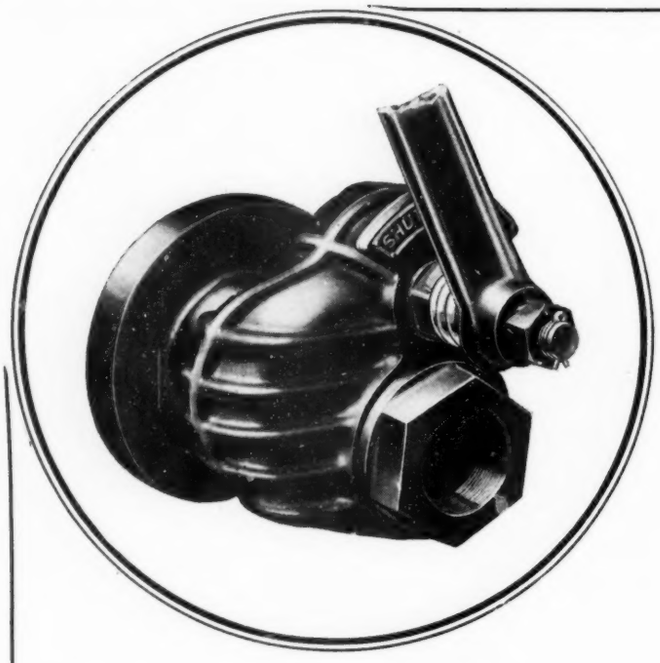
The Pennsylvania has inaugurated a progressive program of renovation for coaches. For two of the first three experimental cars, Heywood-Wakefield's 180 PSS has been selected. This smart new unit was styled by Raymond Loewy *(foremost modernist who also did the interiors)* for the Pennsylvania . . . and it sets a definitely new high in beauty and comfort. All of the latest H-W features including the rotating base, gun-type reclining mechanism, etc., were built into this 180 PSS. It has stainless steel frame; folding center arm rests; simple, yet positive reclining mechanism; flawless tailoring; and perfect relation of pitch between back and seat to assure proper, comfortable posture at all times. May we tell you more about this modern H-W style . . . and about other latest developments in railway seating sponsored by Heywood-Wakefield?

HEYWOOD-WAKEFIELD

ESTABLISHED 1826

General Offices . . . GARDNER, MASS.

Seating FOR *Every Type* OF *Transportation*



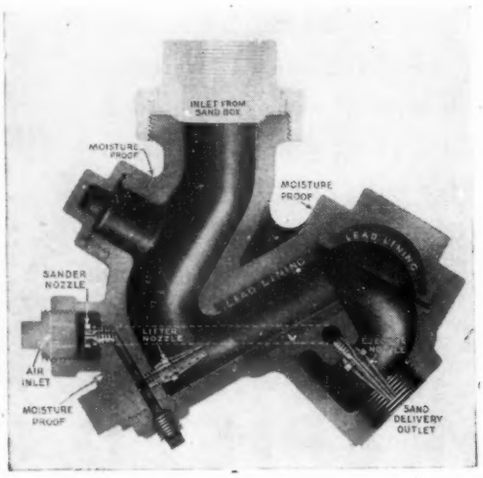
Write for catalog illustrating "Okadee" Valves for Power Boilers

OKADEE CAST STEEL BLOW-OFF VALVES

Increased pressures and more severe service together with application of Separators or Mufflers require stronger valves. "OKADEE" Electric Furnace Cast Steel Blow Off Valves give this greater strength, more flexibility, and extra protection.

THE OKADEE COMPANY
CHICAGO ILLINOIS

VILOCO IMPROVED SANDERS



Can be located above or underneath boilerjacket in a minimum space.

The "VILOCO" FL-317 Sander is original in its entirety. The renewable lead lining, moisture-proof construction, and simple operation assures reliable, economical and efficient service under every operating condition.

Economical in use of air and sand, for maintenance and for cost of application.

Only one valve is required to operate all sanders, regardless of the number used.

VILOCO RAILWAY EQUIPMENT CO.
CHICAGO ILLINOIS

There are many reasons

FOR THE TREND AMONG RAILROADS

toward **TAR-BASE PAINTS**

KOPPERS PRODUCTS AND WHERE THEY APPLY IN THE RAILROAD FIELD	ROOFING MATERIALS	WATERPROOFING	ROAD TARS	CREOSOTE	LUMINO PAINT	LOCOMOTIVE FRONT END PAINT	BITUMINOUS PAINT	DISINFECTANTS INSECTICIDES
ROAD BEDS				✓				
LOCOMOTIVES						✓	✓	
STATIONS	✓	✓		✓				✓
SHOPS	✓	✓		✓	✓		✓	✓
BRIDGES		✓	✓	✓	✓		✓	
TUNNELS		✓	✓		✓			
DRIVEWAYS			✓					
POWER HOUSES	✓	✓		✓	✓		✓	
CONCRETE STRUCTURES		✓			✓		✓	
GRADE CROSSINGS			✓					
CATTLE PENS				✓				✓

ONE REASON IS THAT TAR-BASE PAINTS *are waterproof*

Tar-base paints are well known for their waterproof qualities. On places where water must be excluded and corrosion prevented, they often provide a greater degree of protection than other types of paints. They are economical in first cost and are very long-lasting.

They are available either in natural black finishes, or in aluminum finish. The aluminum-finish Lumino Paint gives two-coat protection with one application.

If you do not already know by experience what tar-base paints can do for you in protecting stacks, fences, metal work, metal buildings and concrete and masonry structures . . . let us send you the booklets about these paints.

KOPPERS PRODUCTS COMPANY

Koppers Building - Pittsburgh, Pa.

Roofing, Waterproofing, Dampproofing, Creosote, Tarmac for Paving, Tar Base Paints

KOPPERS

TAR-BASE PAINTS

Koppers Products Co., Pittsburgh, Pa.
Send me information on ☐ Roofing ☐ Waterproofing ☐ Road Tars ☐ Creosote ☐ Lumino Paint ☐ Front End Paint ☐ Bituminous Paints ☐ Disinfectants and Insecticides.

Your Name..... Title.....

Address.....

.....

BARS, SHAPES AND PLATES
JAL-TEN
A NEW HIGH-TENSILE STEEL FOR CAR CONSTRUCTION
Provides greater strength with reduced weight—easily fabricated—adaptable to any design and to the construction of any type of car.
SEAMLESS STEEL BOILER TUBES
SEAMLESS AND WELDED STEEL PIPE
including small size seamless for added safety in air lines.
TRACK SPIKES
THE PLATES
For Your Diversified Steel Requirements
DEPEND ON THE WIDE VARIETY AND HIGH QUALITY OF J & L RAILROAD MATERIALS

The wide variety of J & L Railroad Materials, and their uniform high quality offer you an opportunity to concentrate many of your purchases with one single reliable source with full assurance of completely satisfactory service.

All J & L steel products for railroad uses are made of selected steel under strict metallurgical control, and rigidly inspected and tested to assure conformity to Jones & Laughlin's traditionally high standards of quality.

Railroad men know from experience that they can always depend on J & L railroad materials. They know that back of their design and production is the engineering, metallurgical and technical knowledge, as well as practical experience, accumulated by Jones & Laughlin through many years of service to the railroad industry.

Look to J & L for your steel requirements. You will be sure of uniform high quality, quick dependable service, and complete buying satisfaction.

OTHER J & L STEEL PRODUCTS FOR RAILROADS

Car Shapes and Plates... Wire Products including Galvanized Dating Nails and Right-of-Way Fence . . . Copper Steel Pipe, Black and Galvanized... Structural Shapes, including Lightweight Channels and Junior Beams . . . Fabricated Structural Work . . . Bars for Concrete Reinforcement . . . Steel Piling . . . Cold Finished Steel . . . Pig Iron

JONES & LAUGHLIN STEEL CORPORATION
AMERICAN IRON AND STEEL WORKS
JONES & LAUGHLIN BUILDING, PITTSBURGH, PENNSYLVANIA

Sales Offices: Atlanta Boston Buffalo Chicago Cincinnati Cleveland Dallas Denver Detroit Erie Houston Los Angeles Memphis Milwaukee Minneapolis New Orleans New York Philadelphia Pittsburgh Seattle St. Louis San Francisco Tulsa
Warehouses: CHICAGO CINCINNATI DETROIT MEMPHIS NEW ORLEANS NEW YORK (Long Island City)* PITTSBURGH
* Operated by National Bridge Works Division of Jones & Laughlin Steel Service, Inc.
Canadian Representatives: JONES & LAUGHLIN STEEL PRODUCTS COMPANY, Pittsburgh, Pa., U. S. A., and Toronto, Ont., Canada

J&L STEEL *Fourth largest steel producer in the U.S.*

PROGRESS IN TRANSPORTATION— AND BRAKES

Modern Trains, both freight and passenger, demand wider performance range in brakes. Precision to the highest degree, in all parts of the braking systems, is vital. Such precision is embodied in the braking systems built in our Plant.

Use "AB" for today's freight trains

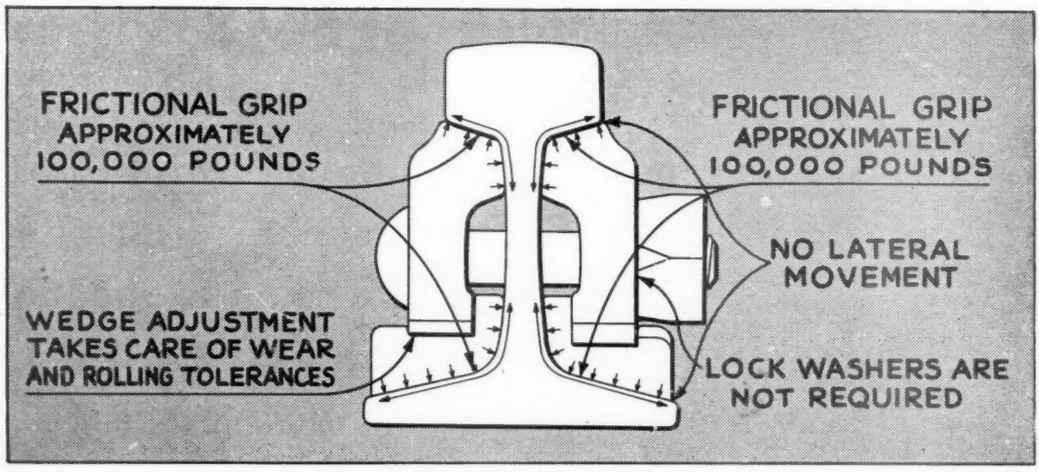
Use "HSC" for High-Speed, Light-weight Passenger Trains.

The New York Air Brake Company

420 Lexington Ave., New York City. Plant: Watertown, New York

TO RAILWAY SUPPLY MANUFACTURERS

The NEAL EXPANSIVE RAIL JOINT


FRICTIONAL GRIP APPROXIMATELY 100,000 POUNDS
FRICTIONAL GRIP APPROXIMATELY 100,000 POUNDS
NO LATERAL MOVEMENT
WEDGE ADJUSTMENT TAKES CARE OF WEAR AND ROLLING TOLERANCES
LOCK WASHERS ARE NOT REQUIRED

This rail joint has been tested for several months under heavy traffic and has proven the following advantages:

1 It has shown less deflection under rolling load than the rail itself.

2 It has shown no lateral movement or movement between parts.

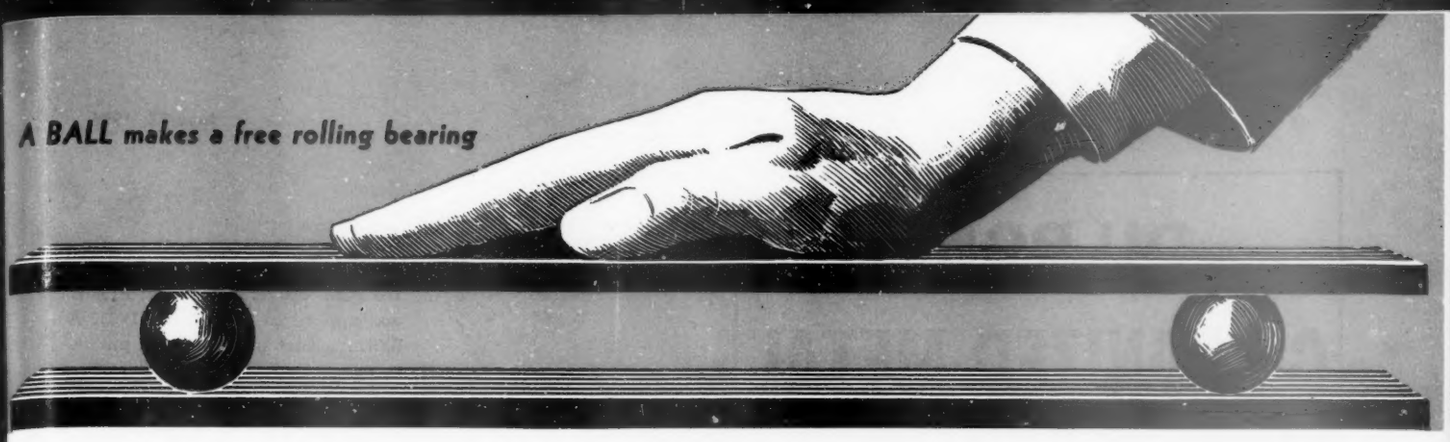
3 It has proven that nut locks are ***not*** required with this type of joint.

4 It has proven that this type of joint not only takes care of rolling tolerance and wear, but will fit rail of different sizes, where fishing angle is the same.

5 It has proven that these joints did not freeze under expansion and contraction, regardless of tremendous frictional grip.

FOR FULL PARTICULARS INQUIRE

RAILWAY AGE BOX 928, 105 W. ADAMS ST. CHICAGO, ILL.



CRECO BALL BEARING DOORS

can always be operated with ONE HAND

"AUTOMATIC TAKE-UP" DOOR HANDLE

• Wedging action keeps doors tightly closed • Eliminates worn and broken hasps • Is lifted to open doors • Used on any type car

CHICAGO RAILWAY EQUIPMENT COMPANY

McCORMICK BUILDING CHICAGO, ILLINOIS

DU PONT GALVANIZED METAL PRIMER STICKS TO ITS JOB

Du Pont Galvanized Metal Primer was applied to this roof in 1931. A finishing coat of Dulux was put on top of it. Today the finish is still in excellent condition!

INDUSTRY ASKED, "Where can we find a finishing material that will stick to galvanized metal?" There was no satisfactory answer until du Pont scientists developed a primer that really stays where it's put.

Ordinary paint will not stand up for long on this type of metal unless a foothold has first been made by etching in a chemical bath. Even this elaborate and expensive pre-treatment does not prevent the rapid failure of the finish.

To solve this important maintenance problem, du Pont produced a primer that adheres tightly to the metal without special preparation. This primer holds on to weathered or new galvanized metal longer than any other finish that we have ever seen. This lasting protection means lengthened periods between paintings without failure by peeling.

Du Pont Galvanized Metal Primer is easy to apply, and quick-drying. It has good hiding qualities—covering 400 to 500 square feet to the gallon. It is light gray in color and has low gloss to give better adhesion to the finishing coats.

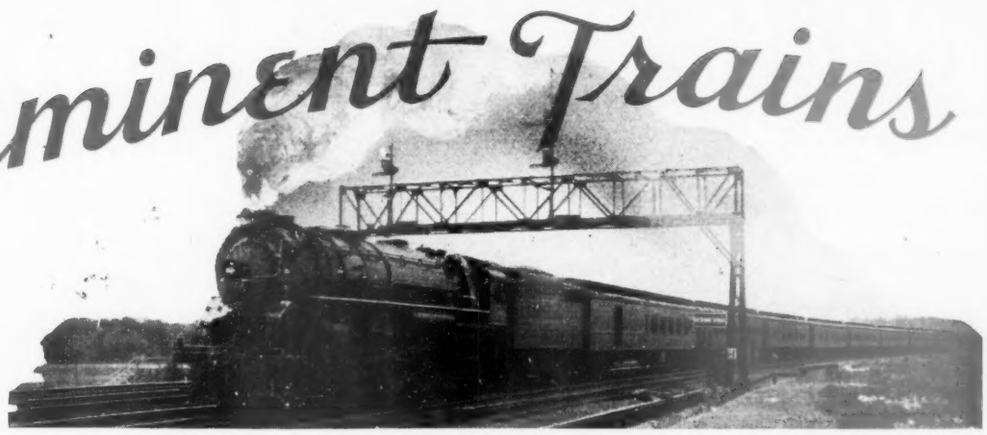
All of these features mean lower application costs and lower upkeep costs. It will pay you to find out about the economy features of Du Pont Galvanized Metal Primer. Ask our representative for detailed information about this product. E. I. du Pont de Nemours & Co., Inc., Finishes Division, Wilmington, Delaware.

DU PONT
REG. U. S. PAT. OFF.

RAILWAY FINISHES

MEASURE YOUR PAINT COST BY THE *performance yardstick*—

Preëminent Trains



CAPITOL LIMITED

THE CHIEF

THE "400"

GEORGE WASHINGTON

GOLDEN STATE LIMITED

OVERLAND LIMITED

PANAMA LIMITED

SUNSHINE SPECIAL

TEXAS SPECIAL

TWENTIETH CENTURY

3 out of 4 Extra Fare Trains Operating in the United States

use

SPRING JOURNAL BOX PACKING

SPRING PACKING CORPORATION

310 So. MICHIGAN AVE. CHICAGO, ILLINOIS

Manufacturers

National Waste Company

Chicago - Philadelphia

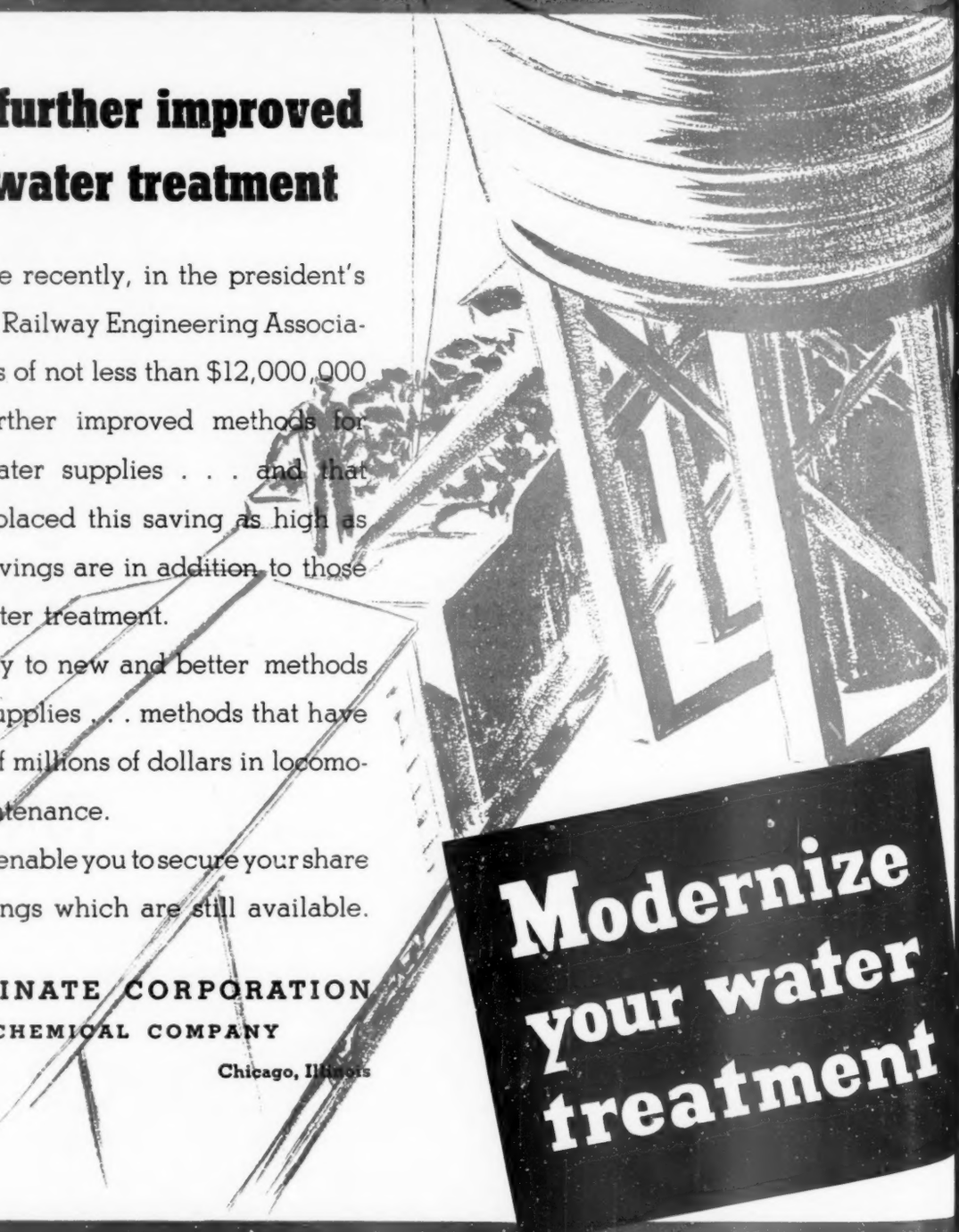
$12,000,000 to $40,000,000 available

. in savings by further improved methods of water treatment

The statement was made recently, in the president's address to the American Railway Engineering Association, that annual savings of not less than $12,000,000 could be made by further improved methods for the conditioning of water supplies . . . and that some authorities have placed this saving as high as $40,000,000.* These savings are in addition to those now being made by water treatment.

Nalco has led the way to new and better methods of conditioning water supplies . . . methods that have accounted for savings of millions of dollars in locomotive operation and maintenance.

The Nalco System will enable you to secure your share of these additional savings which are still available.



Modernize your water treatment

NATIONAL ALUMINATE CORPORATION
PAIGE-JONES CHEMICAL COMPANY
6216 West 66th Place **Chicago, Illinois**

Railway Age, March 14th, 1936

NALCO SYSTEM
OF WATER TREATMENT

URES—

SAFETY

THE "Electrical Test" was originated by this Company to provide final and convincing certainty of flexible staybolt security. Should one flexible bolt exist with even a half section crack—proper application of the "Electrical Test" *will find that bolt.*

And you get this *Added Safety* plus *Complete Protection* at big savings in inspection time and costs. The time is reduced by 60 per cent or more and the cost by 80 per cent or more because you do not have to strip anything off the boiler or remove a single cap. You need Flannery Flexible Staybolts in modern locomotives because they are—

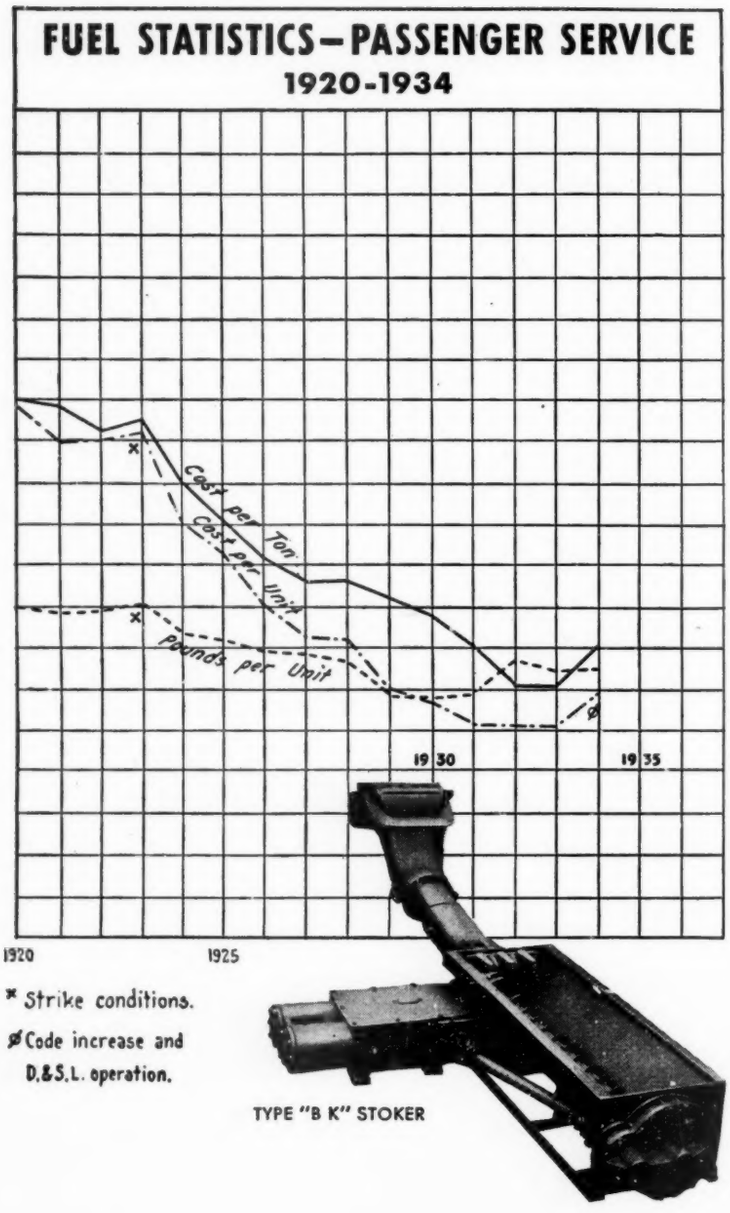
Safest and Most Economical

COMPANY BRIDGEVILLE, PENNSYLVANIA

STOKER FIRING

In Passenger Service

REDUCED FUEL CONSUMPTION 19% • FUEL COSTS 50%



TYPE "B K" STOKER

On the Denver and Rio Grande Western Railroad utilization of slack coal and Stoker firing showed a remarkable reduction in fuel costs in passenger train service.

The report shown below, presented at the 1935 meeting of the International Railway Fuel Association, shows the progressive reduction in fuel costs as the number of stoker fired locomotives increased.

"Record also herewith shows a decrease in consumption per car mile from 21 lbs. in 1920 to 17 lbs. in 1934, or 19%. Speed of trains increased approximately 50% during this period.

"In the years 1932, 1933 and 1934, passenger business decreased and trains were reduced so car mile credit dropped account less cars per train. This affected the record in the past three years.

"Stokered locomotives used in passenger service since 1923.

"Statement showing cost per unit passenger service, in fuel, 1920 to 1934, inclusive:

Year	Cost per pass. car mile (cents)	Year	Cost per pass. car mile (cents)
1920	3.2	1928	1.8
1921	3.0	1929	1.5
1922	3.0	1930	1.4
1923	3.1	1931	1.3
1924	2.5	1932	1.3
1925	2.3	1933	1.3
1926	2.0	1934	1.5
1927	1.8		

"Generally larger power used in 1934 than in 1920 which were all hand-fired."

Stoker firing permits utilization of low cost fuel that cannot be fired successfully by hand.

THE STANDARD STOKER COMPANY, INC.

NEW YORK • CHICAGO • ERIE

ANNOUNCING . . .

CARNEGIE-ILLINOIS

LOCOMOTIVE SIDE FRAMES

•

One-piece, Flame cut from Rolled Steel Slab

HERE is an outstanding development—an important step forward in locomotive main frame construction. It offers *uniform* strength, and consequently a greatly increased factor of safety in this vital part of the locomotive.

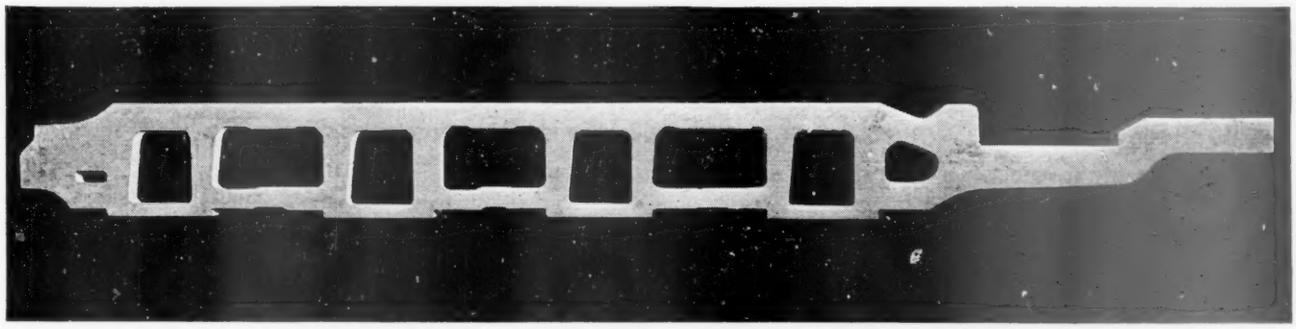
Consider these facts:

The rolled slab from which Carnegie-Illinois Side Frames are cut is of superior quality carbon steel—normalized and tempered, and possessing a high degree of homogeneity.

Carnegie-Illinois Side Frames flame cut from these steel slabs are uniform in strength throughout. There are no blow holes, no gas pockets, no internal stresses or hidden defects to develop weakness and fail in service. These rolled steel frames will take all the load they are designed for — with safety to spare.

The uniformly high physical properties of the steel itself are doubly ensured. Exacting control of every step of manufacture is supplemented by merciless testing. From every frame not merely one test coupon, but as many as nine test pieces, are removed and subjected to bending and tension tests that definitely eliminate uncertainty.

Find out about these tougher, stronger side frames. Send us your blue prints and ask us to figure on the cost of this superior construction.



CARNEGIE-ILLINOIS STEEL CORPORATION

Pittsburgh *Chicago*

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*

United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

...without increasing weight!

With the simple steels, increased boiler pressures call for increased boiler weight. But when steels are *toughened* with Nickel, pressures may be substantially increased without increasing the weight of the plate.

The Nickel Alloy Steels are stronger at elevated temperatures than plain carbon steel.

Additions of Nickel impart superior mechanical properties to both steel and iron, providing materials that give long and low-cost service in a host of railroad applications. We invite consultation on the use of Nickel Alloy Steels, Nickel Cast Irons and other alloys containing Nickel in your equipment.

CAST IRONS **NICKEL** ALLOY STEELS

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL ST., NEW YORK, N.Y.

Speed PLUS RELIANCE and PRECISION

BARCO POWER REVERSE GEARS

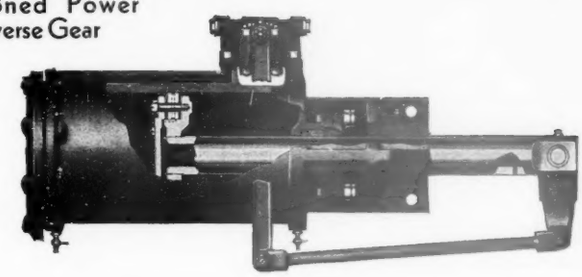
The exacting demands of today's high speed trend, are squarely met in the design of the BARCO Type M Power Reverse Gear.

The Dual Control Valve is self-centering, almost frictionless—easy to set to the finest cut-off required—accurately and positively maintains the cut-off selected.

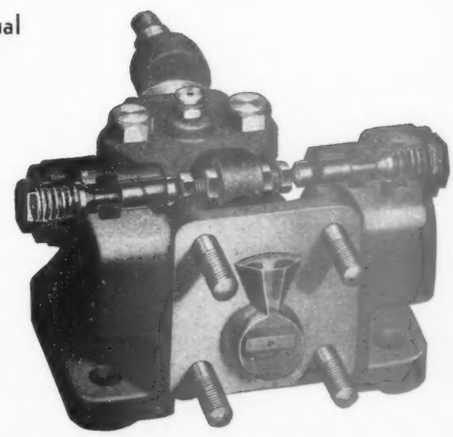
Perfect alignment is certain with the integral piston rod guide or bearing construction—increasing the service life of packing and cups.

For road and switching service—speed with dependable accuracy — BARCO Power Reverse Gears give better service at lower cost.

Barco Type M Air Cushioned Power Reverse Gear



Interior Barco Dual Control Valve



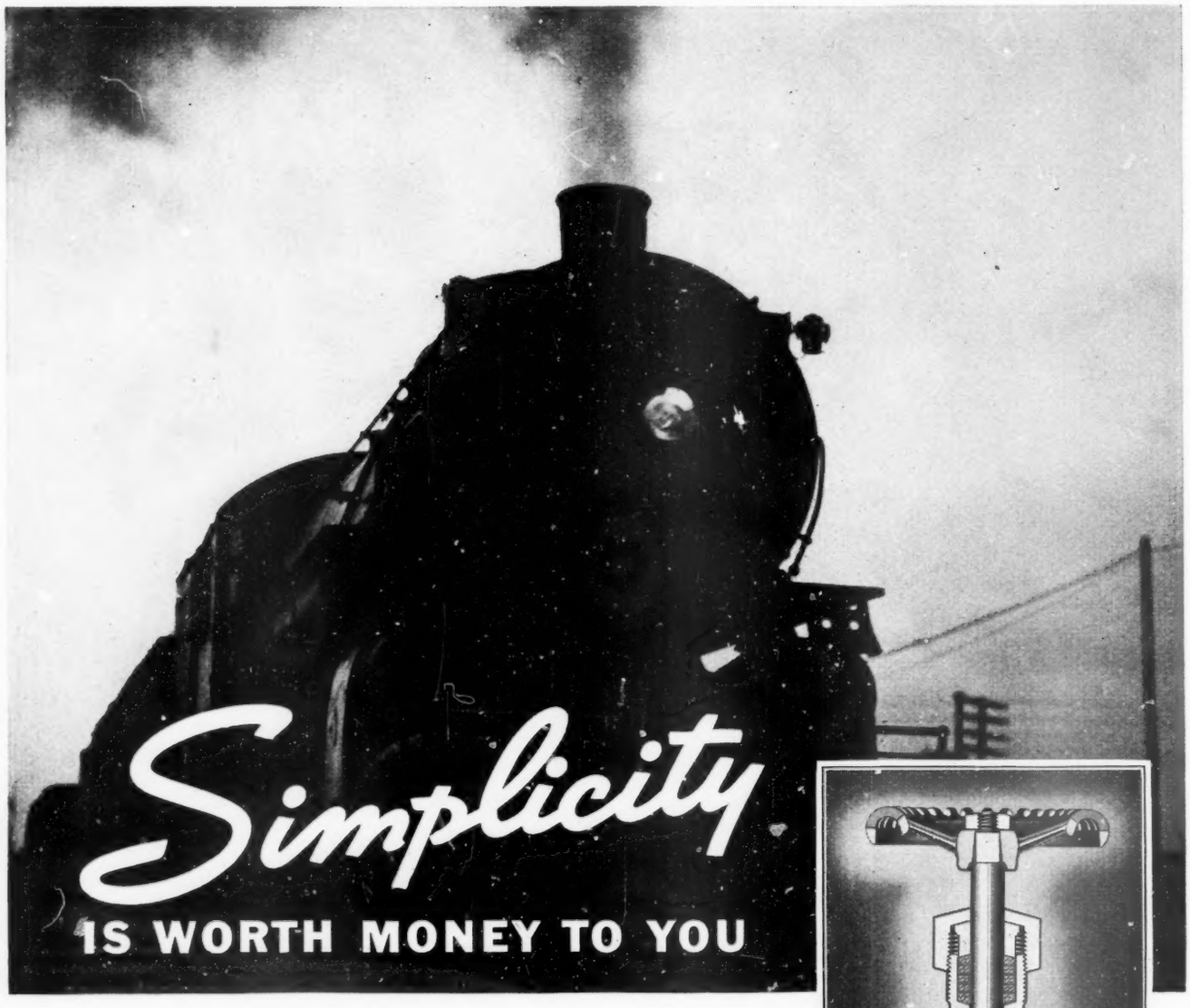
BARCO MANUFACTURING COMPANY

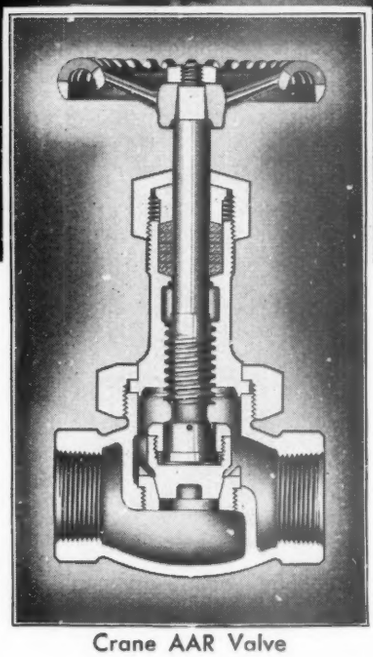
1807 W. Winnemac Avenue, Chicago, Illinois

The Holden Co., Ltd.

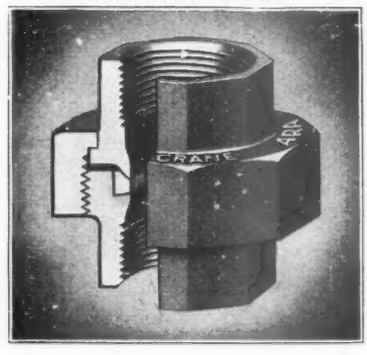
In Canada

Montreal « Moncton « Toronto « Winnipeg « Vancouver





Crane AAR Valve
Crane AAR Union



Crane experience and assistance on piping layouts can help you reduce the number of joints and the labor and material involved. And when you use Crane AAR Valves, Unions and Union Fittings, you know that they are made to precision standards, are uniform in strength and give tight seats despite frequent disassembly. The Crane branch or distributor near you is completely stocked with valves, fittings, unions, etc., for every requirement. It is qualified and ready to assist you on your piping problems.

CRANE

CRANE CO., GENERAL OFFICES: 836 SOUTH MICHIGAN AVE., CHICAGO, ILLINOIS
NEW YORK: 23 WEST 44TH STREET
Branches and Sales Offices in One Hundred and Sixty Cities

RAILROAD VALVES, FITTINGS AND PLUMBING FIXTURES

PREPARE NOW *for* HEAVIER TRAFFIC

ALL the motive power you have—and more—will soon be needed—urgently! The highest car loadings in five years indicate that the tide has turned. Traffic demands are increasing—thousands of locomotives should be made ready now for the approaching flood of business.

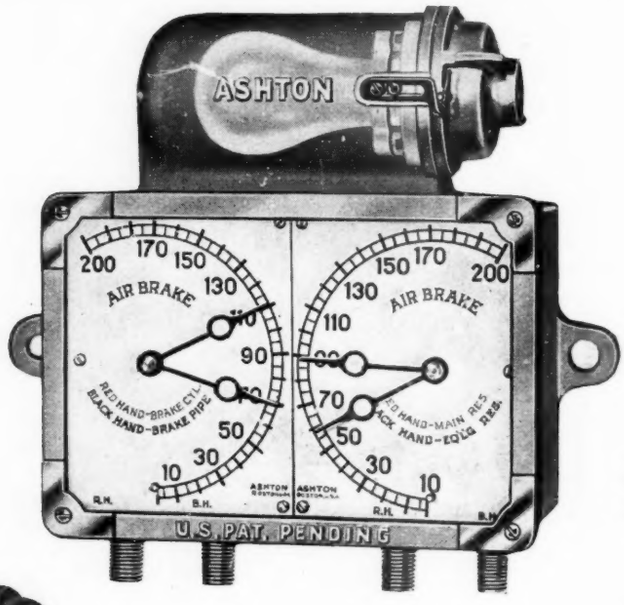
Is your motive power ready? How about your staybolts? Staybolt Iron produced by the Ewald Iron Company has been a standard on leading American railroads for many years. This iron is soft, ductile, and has every physical property that staybolt iron must have to withstand modern high boiler temperatures and pressures. It is a sure protection against boiler troubles and engine service losses.

EWALD IRON COMPANY
LOUISVILLE

CHICAGO NEW YORK ST. PAUL

MODERN GAGES *for* MODERN POWER

IMPROVED DUST PROOF GAGES



ASHTON
Quadruplex Air Brake Gage No. 62-QI-3—5" Dials Non-glaring — Positively Dust-Proof.

ASHTON
Locomotive Double Dial Steam Gage No. 52-DI-2 6¾" Dials—Standard Graduations, 300 - 400 - 500 lb. Positively Dust-Proof.

ASHTON
Air Brake Gage No. 62-B.A.B.—5" dial equipped with shield adjustable to any one of 4 positions—providing 4 gages in one!

THE improved Ashton Quadruplex Air Brake Gage 62-QI-3 is made positively dust-proof by means of felt gaskets in all joints—lighting hood cast integral with face rim—dials have a dull, white, porcelain enamel finish eliminating glare and shadows—thus providing perfect visibility. Over 6,000 of the original design quadruplex Ashton Gage are now in service!

Ashton Double Dial Gage 52-DI-2 has 6¾" dials, either silvered—black—or finished in non-glaring, white enamel. This gage is also provided with a lighting hood cast integral with the case, face ring—joints are made absolutely dust-proof—all electrical equipment is interchangeable with Gage 62-QI-3—and wiring is not disturbed when removing gages for testing, or when renewing lamps.

Ashton Air Brake Gage 62-B.A.B. is equipped with a simple, adjustable shield readily secured in four different positions, and thus permitting the gage to be used for any one of the four services indicated. Effects important economies by reducing number of gages carried in stock. When so ordered can be furnished with dust-proof case and ring.

The Ashton Valve Company

161-179 FIRST STREET, CAMBRIDGE, BOSTON, MASS.

21-23 Albany Street
New York, N. Y.

565 Washington Boulevard
Chicago, Ill.

606 Howard Street
San Francisco, Calif.

Riding with

THE REXALL TRAIN!

THE New York Central Streamlined locomotive that will haul the twelve car United Drug train to 109 cities in the United States and Canada is of special oil burning type and equipped 100% with General Refractories first quality Fire Clay Brick and BRIKLOK High Temperature Cement.

Many railroads buy G.R.Co. refractories because they get the advantage of a quality product ***designed, manufactured, sold and serviced by one organization.***

Where service is severe, where reliability meets extreme demands, where schedules must be maintained without interruption—use General Refractories products.

GENERAL REFRACTORIES COMPANY

PHILADELPHIA, PENNA.

Railway Department: 420 Lexington Ave., New York, N. Y.

A COMPLETE REFRACTORIES SERVICE

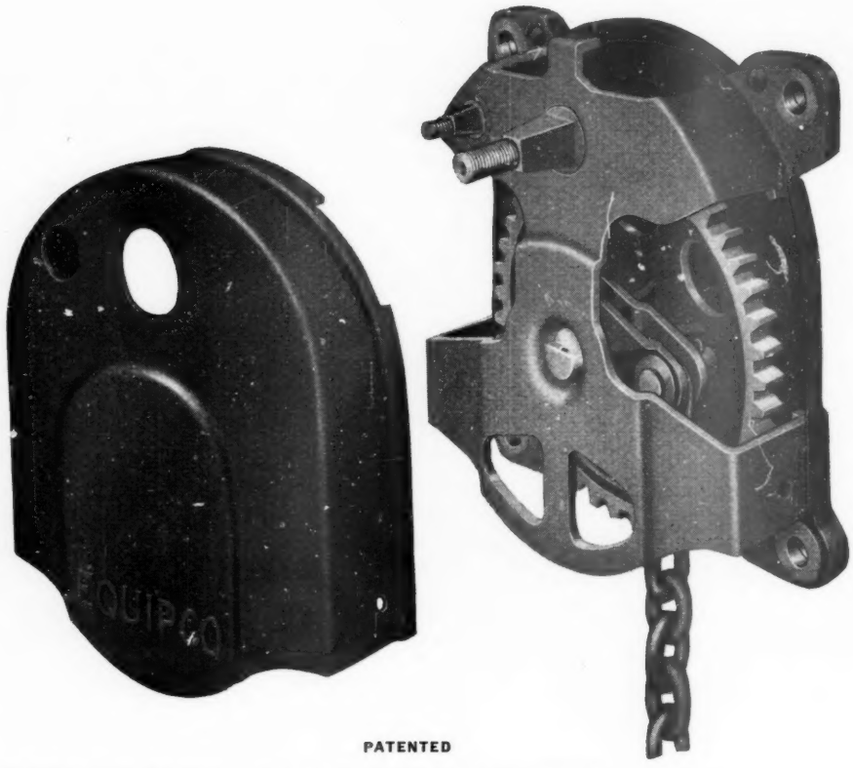
6286

EQUIPCO
POWER HAND BRAKE

The Equipco removable housing which allows inspection of all of the working parts of the brake. No special tools or equipment required.

It is not necessary to shop the car or remove the brake unit from car in order to inspect the mechanism.

A ready means of inspecting vertical wheel brakes is not only desirable but an absolute necessity from safety standpoint.



PATENTED

A BRAKE WHICH CANNOT BE INSPECTED IS NOT A SAFE BRAKE!

Complies fully with A.A.R. specifications for geared hand brakes

There are many thousands of vertical wheel brakes in service which have no means for inspecting the mechanism as they have permanently secured housing which cannot be removed without taking entire brake unit off of car. This requires shopping of car, cutting four large rivets which secure unit to car, further cutting of 4 to 6 rivets before front and back housings can be separated, at which time all of the parts fall out.

EQUIPMENT SPECIALTIES DIVISION
of Union Asbestos & Rubber Company
310 So. Michigan Ave.
CHICAGO, ILL.

LESS WEIGHT • MORE PAYLOAD
ADDED RIDING COMFORT • GREATER DEPENDABILITY
with Vanadium Steels

FOR every railroad application there is a Vanadium Steel ideally suited to improve operating dependability; reduce weight and increase the payload, minimize maintenance; and improve riding comfort.

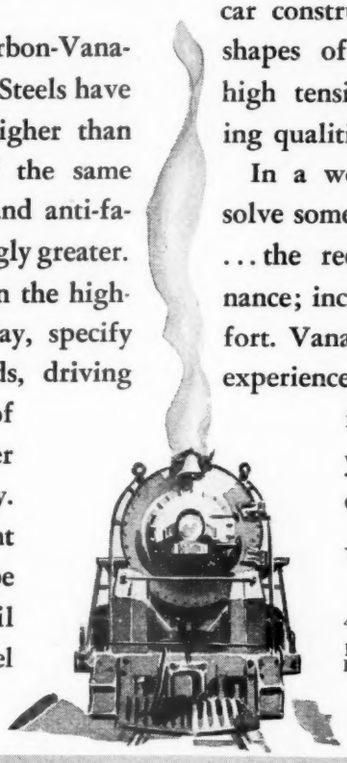
Axles, pins, rods, etc., of Carbon-Vanadium and Manganese-Vanadium Steels have a useful strength fully 50% higher than plain carbon steel forgings of the same section. Their shock resistance and anti-fatigue properties are correspondingly greater.

For the stresses encountered in the high-speed, long run service of today, specify main engine frames, cross-heads, driving boxes, car truck castings, etc., of Vanadium Cast Steels for greater strength, toughness and durability.

Riding comfort, more important today than ever before, can be improved materially with coil springs of Silicon-Vanadium Steel and leaf springs of Chromium-Vanadium Steel. In many cases these steels permit a reduction of spring size and weight. In all cases they reduce spring failures to a minimum.

Weight can be reduced in locomotive and car construction by the use of plates and shapes of Manganese-Vanadium Steel, a high tensile steel with exceptional welding qualities.

In a word, Vanadium Steels will help solve some of your most pressing problems ... the reduction of weight and maintenance; increase of payload and riding comfort. Vanadium Metallurgists, qualified by experience to help you select the best steel for a specific purpose, are at your disposal without cost or obligation.



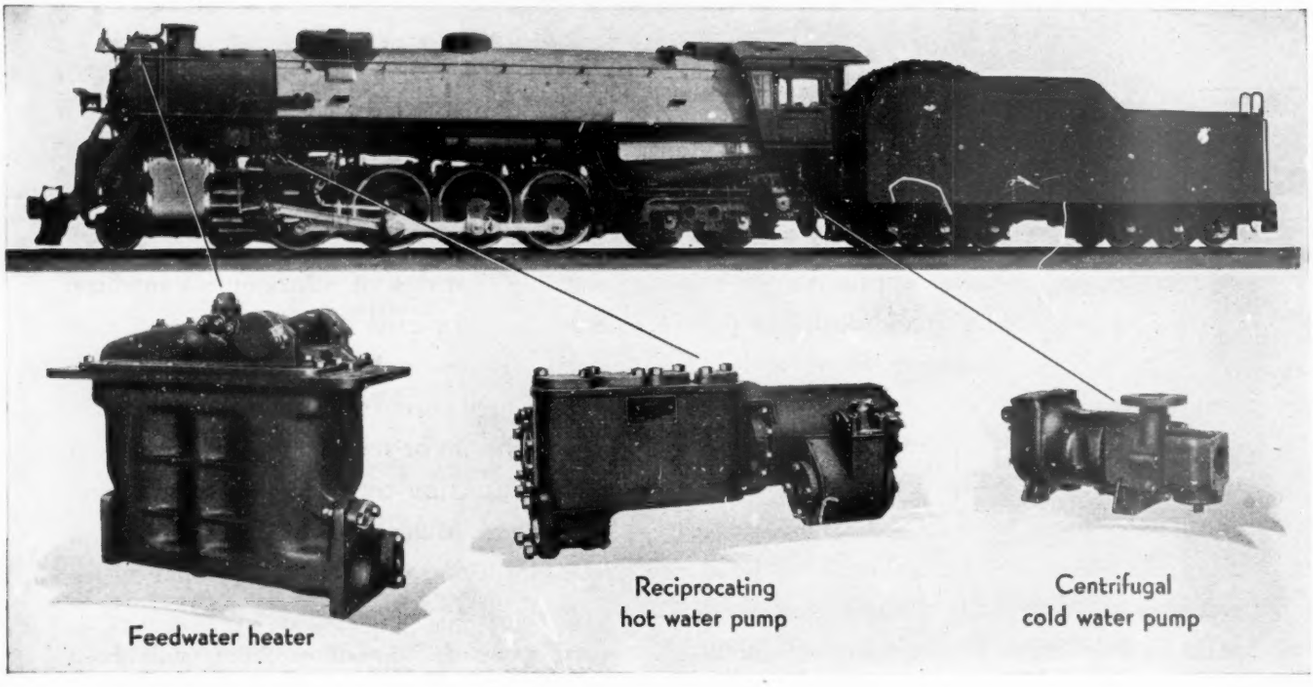
VANADIUM CORPORATION OF AMERICA
420 LEXINGTON AVENUE, NEW YORK, N. Y.
Plants at Bridgeville, Pa., and Niagara Falls, N. Y.
Research and Development Labs., Bridgeville, Pa.

Vanadium Steels
FOR STRENGTH · TOUGHNESS · DURABILITY

METALS VANCORAM ALLOYS

FERRO ALLOYS
of vanadium, silicon, chromium, and titanium, produced by the Vanadium Corporation of America, are used by steel makers in the production of high-quality steels.

On 5000 locomotives in all parts of the world . . .



Facts:

- *Returns of 40 to 60% annually on investment*
- *Capacity increased as much as 17%*
- *Deaeration removes oxygen . . . reduces corrosion*
- *Unaffected by scale accumulations*
- *Less total weight for same capacity*
- *Negligible maintenance*

WORTHINGTON LOCOMOTIVE FEEDWATER HEATING EQUIPMENT is demonstrating its outstanding value for maximum sustained operating economy, as well as its many important advantages in transportation results, apart from directly measurable savings.

Complete details . . . and representative performance data from operating records . . . are available on request.

WORTHINGTON PUMP AND MACHINERY CORPORATION

General Offices: **HARRISON, NEW JERSEY** - *Branch Offices and Representatives in Principal Cities throughout the World*

WORTHINGTON

ATLANTA BOSTON BUFFALO CHICAGO CINCINNATI CLEVELAND DALLAS DENVER DETROIT EL PASO HOUSTON KANSAS CITY LOS ANGELES NEW ORLEANS NEW YORK PHILADELPHIA PITTSBURGH ST. LOUIS ST. PAUL SAN FRANCISCO SEATTLE TULSA WASHINGTON

A-36285

Use Seamless Tubes for *Safety*..

GLOBE Seamless TUBES

In designing the famous *Hiawatha*, the American Locomotive Company specified only first class materials, including Globe Seamless steel boiler and superheater tubes.

The nationwide drive for safety! Are you doing your part? One way you can help is to specify, buy and use *safe* tubing.

Globe Steel Tubing is *seamless* for safety. It safeguards human life and valuable property—protects against sudden tube failure—saves costly delays and repairs. It promotes safety in countless installations everywhere.

In tubes, even a small added margin of strength can mean the difference between safety and disaster. Globe Seamless Tubes offer a big extra margin of safety, because of these four important advantages:

Safer Walls—No seams or welds. No potential weak points along the line of a weld, which might give a starting place for costly failure.

Safer Walls—Complete homogeneity of wall structure. Each tube pierced from a solid billet of steel. Structurally uniform and sound from end to end.

Safer Walls—Only first class killed open hearth and electric furnace steels. Poorly killed or rimmed steel will not survive the Globe piercing operation.

Safer Walls—25 years of specialization in seamless tubing products. Severe and thorough inspection at all stages of manufacture.

You can have the reliability and safety of Globe Seamless Tubes in all standard SAE analyses, and other special alloys, such as copper bearing steel, Toncan Iron, stainless steels, 5% chromium alloys, with or without molybdenum.

Let a Globe engineer assist you in selecting tubes suited to your needs. Write us about your problems.

GLOBE STEEL TUBES CO.
4003 W. Burnham St., Milwaukee, Wisconsin.

GLOBE STEEL TUBES
Seamless for Safety

SECURITY BOND

OIL CONTROL JOURNAL BEARING

Designed to overcome difficulties encountered in A.A.R. Journal Bearings.

THE Security Bond feature increases the bonding area of lining metal to brass 30% to 40%, eliminating cracked and loose linings.

The Oil Control feature consists of longitudinal channels, with projecting lugs, which distribute the oil lengthwise of the Journal. These Channels serve as traps for lint and waste particles, eliminating one of the chief causes of hot boxes.

Increased life, less delays on the road, and big savings in maintenance costs are shown by service records of installations on cars, engine trucks, trailers and tenders.

NATIONAL BEARING METALS CORP.

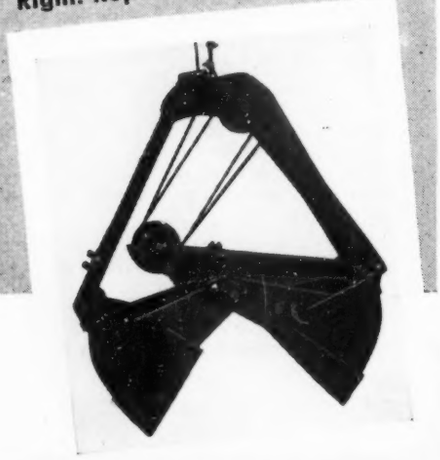
ST. LOUIS, MISSOURI

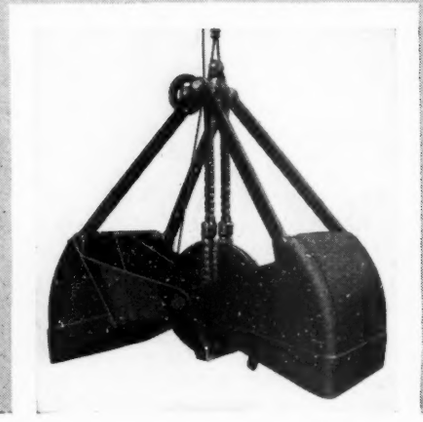
Jersey City, N. J. — New York, N. Y.
Portsmouth, Va. — Pittsburgh, Pa.
Meadville, Pa. — St. Paul, Minn.

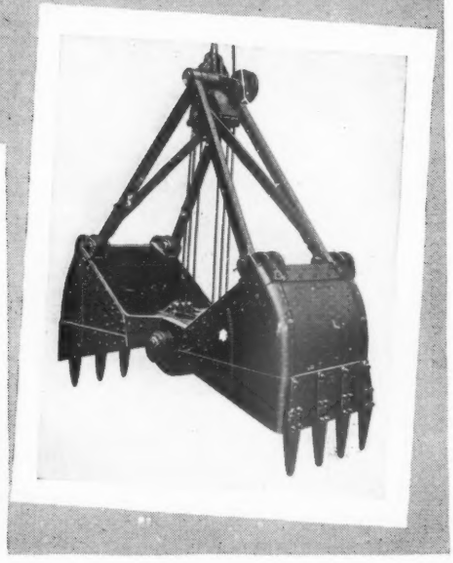
ROPE-REEVE • POWER-WHEEL • LEVER-ARM

BUCKETS

Below: Lever-arm Bucket
Center: Power-wheel Bucket
Right: Rope-reeve Bucket







a type and size to fit every need... capacities 1/2 to 15 yards... and a catalog which tells the jobs for which each bucket is best fitted.

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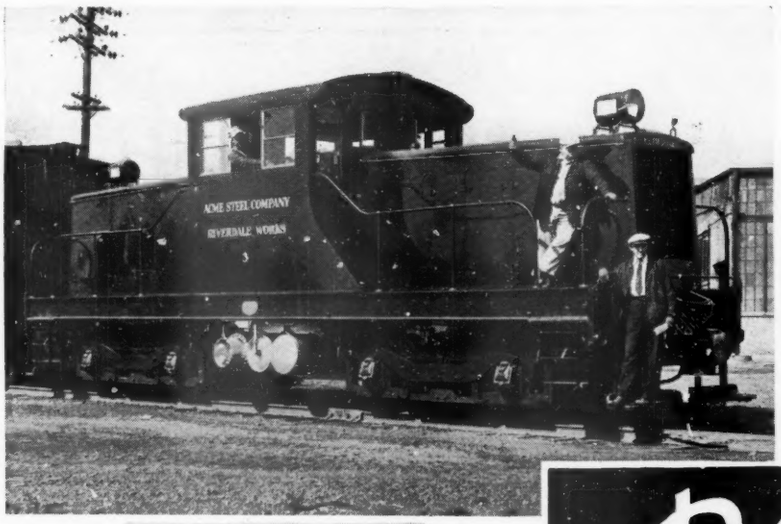

70-TON PROPANE-BUTANE ELECTRIC

Acme Steel Company

La Salle and Bureau County Railroad

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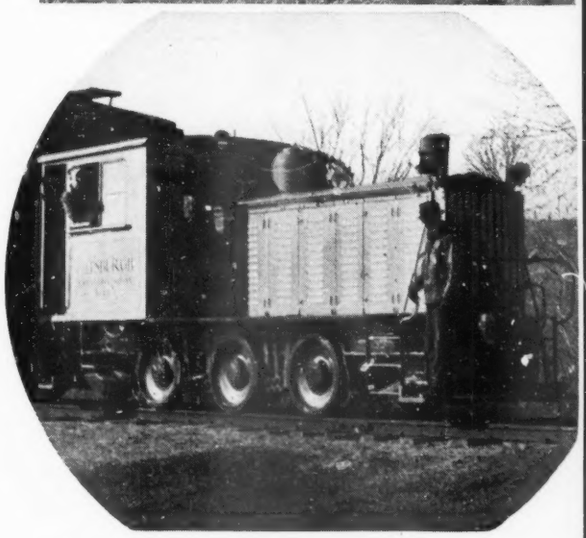

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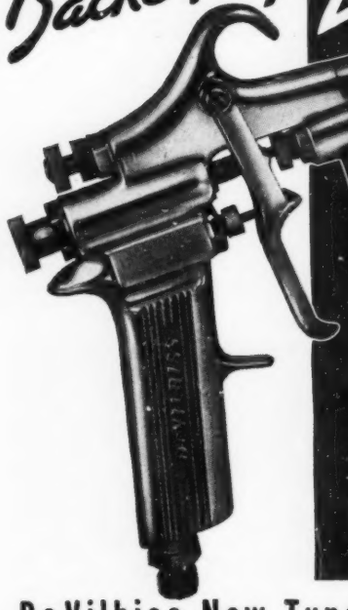

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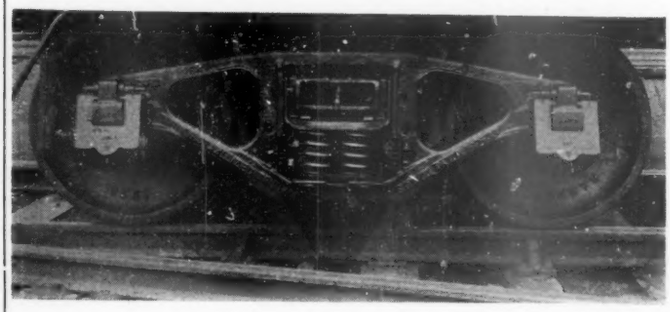

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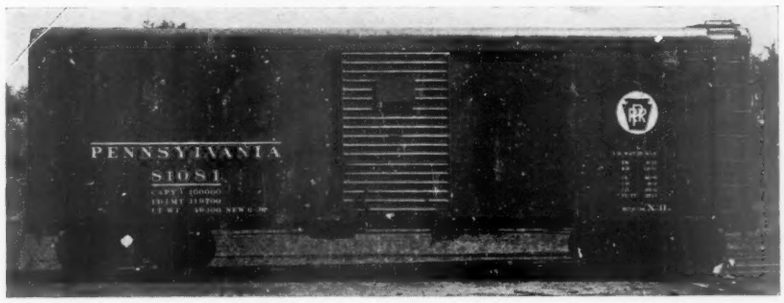

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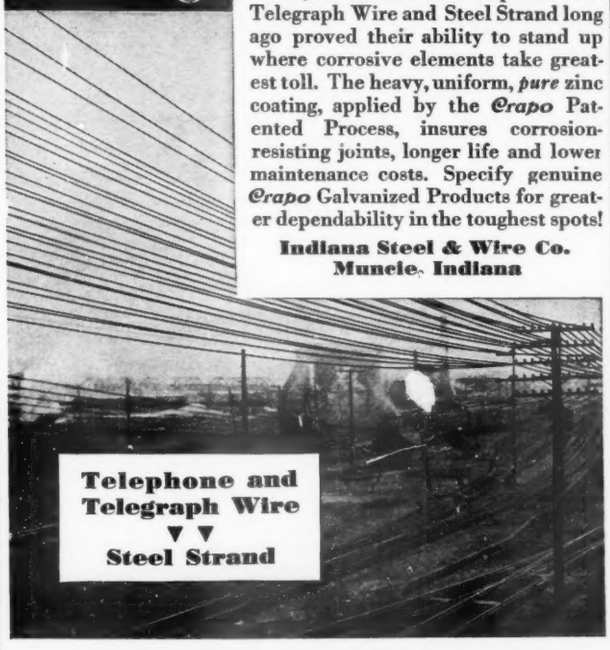

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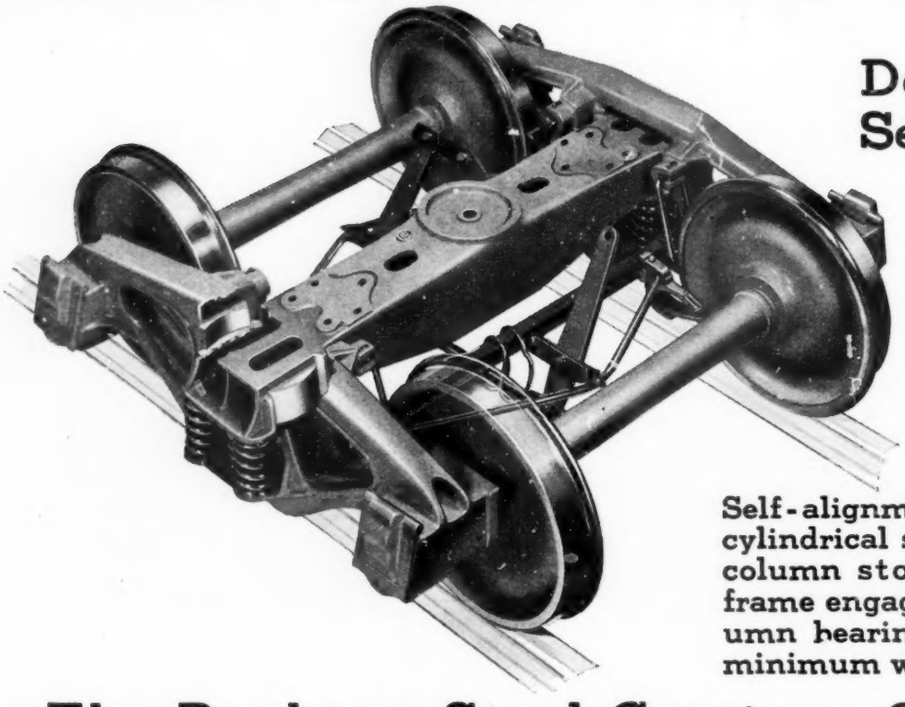

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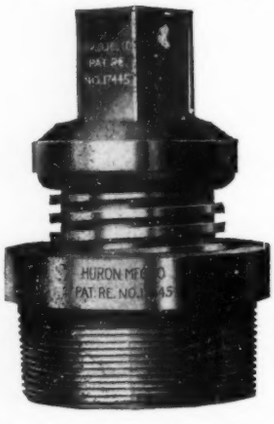

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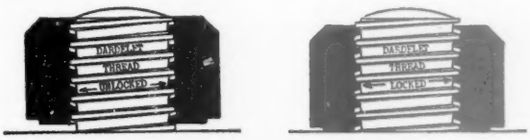

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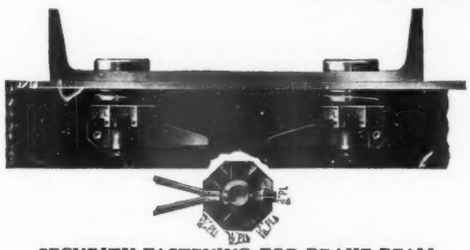

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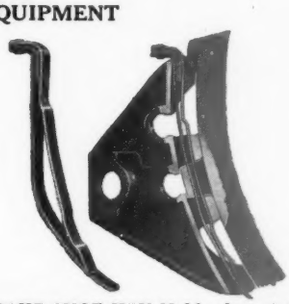

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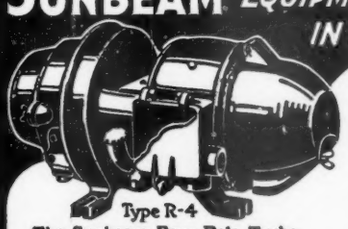

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Index to Advertisers

June 27, 1936

A

Air Reduction Sales Co..... 30
American Arch Company, Inc..... 64
American Brake Shoe & Fdry. Co., The 26, 27
American Hair & Felt Co..... 32
American Locomotive Co....67, 68, 69
American Steel Foundries..... 29
American Steel & Wire Co..... 11
Armco Railroad Sales Co..... 31
Ashton Valve Co., The..... 82
Association of Mfrs. of Chilled Car Wheels 46

B

Baldwin Locomotive Works, The.14, 15
Bantam Ball Bearing Co., The..... 28
Barco Manufacturing Co..... 79
Bethlehem Steel Co..... 21
Buckeye Steel Castings Co., The... 91
Budd Mfg. Co., Edward G.....22, 23
Buffalo Brake Beam Co..... 95

C

Canadian Cardwell Co., Ltd..... 40
Cardwell Westinghouse Co..... 40
Carnegie-Illinois Steel Corp...8, 9, 77
Celotex Corp., The..... 45
Chevrolet Motor Co..... 36
Chicago Railway Equipment Co.... 55
Classified Advertisements..... 94
Columbia Steel Co.....8, 9, 11, 77
Crane Co..... 80

D

Dardelet Threadlock Corp..... 93
Dearborn Chemical Co..... 37
DeVilbiss Company, The..... 90
Dry-Zero Corporation..... 32
duPont De Nemours Co., E. I..... 56

E

Edgewater Steel Co..... 43
Edison Storage Battery Div. of Thomas A. Edison, Inc..... 39
Electric Storage Battery Co., The.. 35
Evans Products Co..... 93
Ewald Iron Company..... 81

F

Flannery Bolt Co.....74, 75
Franklin Railway Supply Co., Inc. 62, 63

G

General American Transportation Corp. 44
General Electric Co..... 47
General Railway Signal Co. 4, 5, Back Cover
General Refractories Company..... 83
General Steel Castings Corp....12, 13
Get Together Department..... 94
Globe Steel Tubes Co..... 87
Gold Car Heating & Lighting Co... 96
Gould Coupler Co., The..... 19
Griffin Wheel Co..... 48

H

Harbison-Walker Refractories Co... 64
Hennessy Lubricator Co..... 94
Heywood-Wakefield 49
Hunt-Spiller Mfg. Corp..... 97
Huron Manufacturing Co..... 92
Hyman-Michaels Company..... 96

I

Indiana Steel & Wire Co..... 91
Industrial Brownhoist 88
Inland Steel Company..... 3
International Harvester Co..... 10
International Nickel Co., Inc., The 78
Iron & Steel Products, Inc..... 94

J

Jones & Laughlin Steel Corp..... 52

K

Kerite Insulated Wire & Cable Co., Inc. 91
Kinnear Mfg. Co., The..... 94
Koppers Products Co..... 51

L

Lima Locomotive Works, Inc..... 61
Locomotive Firebox Co..... 38

M

Magnus Co., Inc..... 6
Miner, Inc., W. H..... 7

N

National Aluminate Corp..... 58
National Bearing Metals Corp..... 88
National Carbide Sales Corp..... 95
National Malleable & Steel Castings Cc. 16, 17
National Waste Co..... 57
New York Air Brake Co., The..... 53

O

Ohio Locomotive Crane Co., The... 94
Okadee Co., The..... 50
Okonite-Callender Cable Co., Inc., The 2
Okonite Company, The..... 2
Oxweld Railroad Service Co., The.. 41

P

Paige-Jones Chemical Co..... 58
Pittsburgh Spring and Steel Co.... 92
Plymouth Locomotive Works Div. of The Fate-Root-Heath Co..... 89
Pullman-Standard Car & Mfg. Corp Front Cover

R

Railway Educational Bureau..... 94
Railway Steel Spring Div. of American Locomotive Co..... 20
Ralston Steel Car Co., The..... 91
Republic Steel Corp..... 60

S

Spring Packing Corp..... 57
Standard Car Truck Co..... 92
Standard Stoker Co., Inc., The.... 76
Sturtevant Co., B. F..... 34
Sunbeam Electric Mfg. Co..... 95
Superheater Company, The.....65, 66

T

Tennessee Coal, Iron & Rd. Co..... 11
Timken Roller Bearing Co., The..24, 25
Tuco Products Corp..... 95

U

Union Asbestos & Rubber Co..... 84
Union Carbide & Carbon Corp..... 41
Union Switch & Signal Co. 70, 71, Back Cover
U. S. Steel Products Company 8, 9, 11, 77
U. S. Steel Corporation Subsidiaries 8, 9, 11, 77

V

Vanadium Corp. of America..... 85
Vapor Car Heating Co., Inc..... 18
Viloco Railway Equipment Co..... 50

W

Walworth Company..... 33
Waugh Equipment Co..... 73
West Disinfecting Co..... 94
Westinghouse Air Brake Co..... 72
Worthington Pump & Machinery Corp. 86

Y

Youngstown Sheet & Tube Co., The 42
Youngstown Steel Car Corp..... 95

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Track—RAILROAD DISMANTLING—Car

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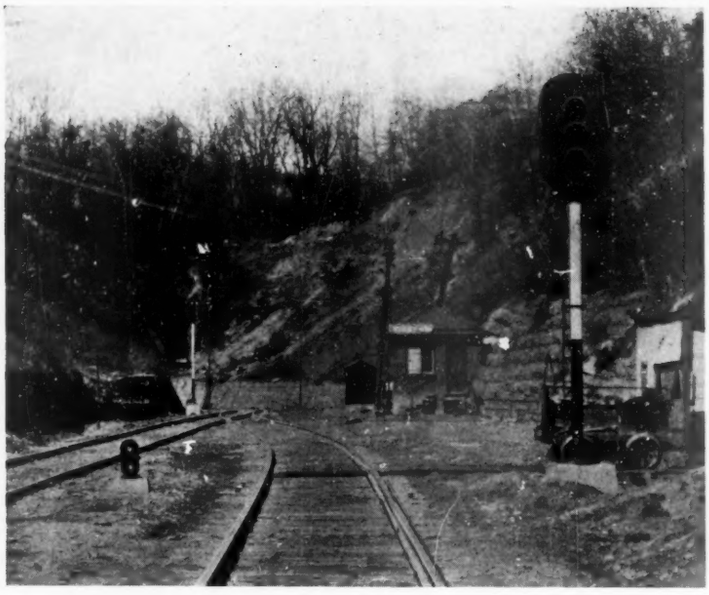

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